

UNIVERSITY OF MICHIGAN

NOV 5 - 1959

SCIENCE LIBRARY

The Mining Journal

LONDON, OCTOBER 16, 1959

Vol. 253. No. 6478.

Price Ninepence

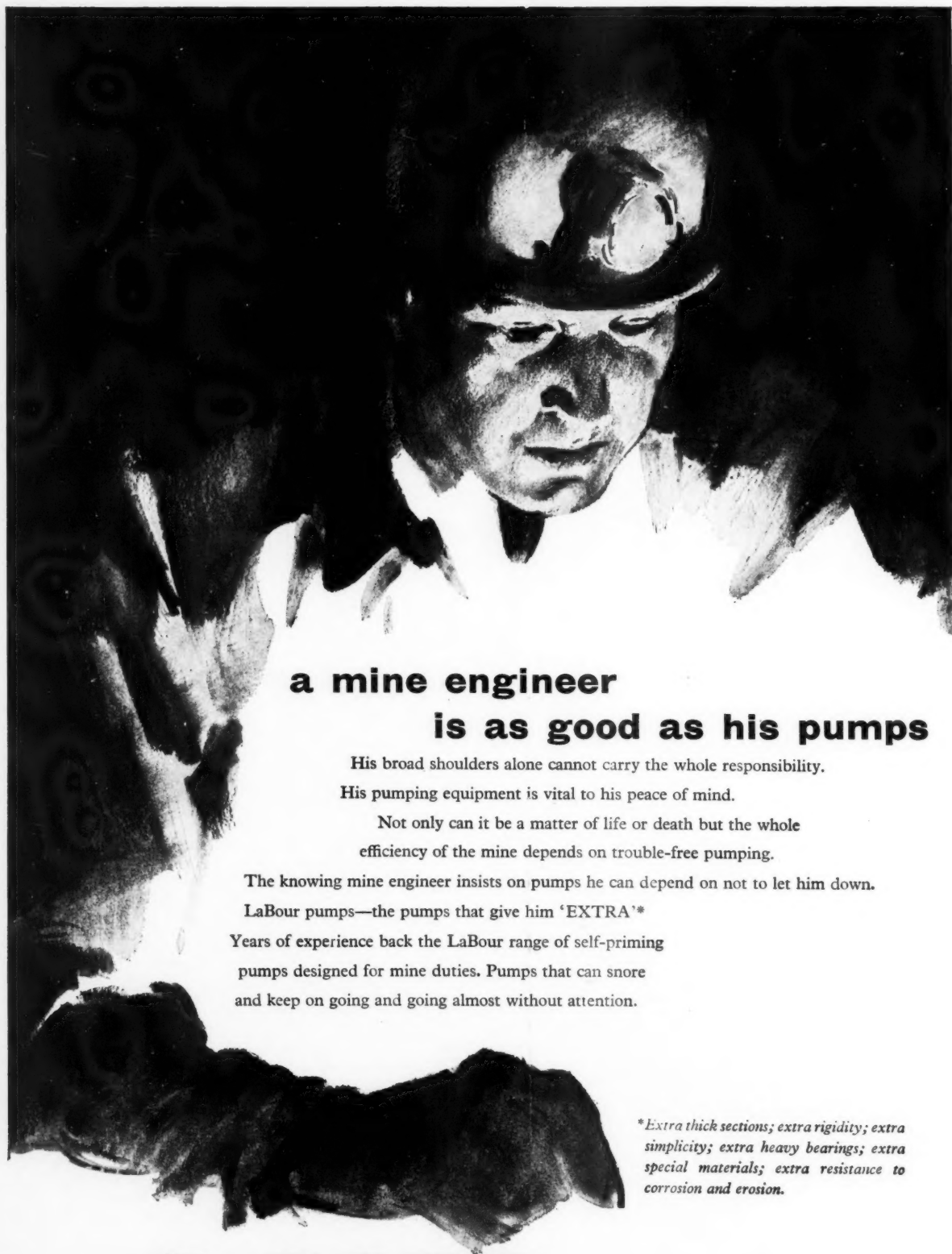
RAPIER WALKING DRAGLINES and stripping shovels

RANSOMES & RAPIER LTD

IPSWICH & LONDON ENGLAND

RAPIER

WALKING DRAGLINES
EXCAVATORS
MOBILE CRANES
CONTRACTORS PLANT
WATER CONTROL
RAILWAY PLANT



**a mine engineer
is as good as his pumps**

His broad shoulders alone cannot carry the whole responsibility.
His pumping equipment is vital to his peace of mind.

Not only can it be a matter of life or death but the whole
efficiency of the mine depends on trouble-free pumping.

The knowing mine engineer insists on pumps he can depend on not to let him down.
LaBour pumps—the pumps that give him 'EXTRA'*
Years of experience back the LaBour range of self-priming
pumps designed for mine duties. Pumps that can snore
and keep on going and going almost without attention.

**Extra thick sections; extra rigidity; extra
simplicity; extra heavy bearings; extra
special materials; extra resistance to
corrosion and erosion.*

LABOUR

BRITISH LABOUR PUMP CO LTD BLUNDELL ST LONDON N7 Telephone NORTH 5601-5

The Mining Journal

London, October 16, 1959

In this issue . . .

Scaling Down	359
International Standardization Activities	360
Mining Projects in Australia	360
Promising Molybdenum Occurrence in Sierra Leone	361
Iron Ore May Become Liberia's Largest Export	361
Vaal Reefs' World Shaft Sinking Record	362
Mount Isa Solves a Transport Problem	364
Ore Mining in Poland	366
Machinery and Equipment	367
Mining Miscellany	369
Metals and Minerals	370
London Metal and Ore Prices	372
Mining Finance	373
Company Meetings	374
Coming Events	375
Company News	376

Vol. 253

No. 6478

Established 1835

Editor

U. Baliol Scott

Deputy Editor

A. Graham Thomson

Assistant Editor

R. Bowran

Assistant Financial Editor

R. A. Nuttall

Display Advertisement Manager

E. S. Hooper

Circulation

Robert Budd

Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott
(Chairman)

U. Baliol Scott
(Managing)

G. A. Baliol Scott

R. A. Ellefsen

**15 WILSON STREET,
LONDON, E.C.2**

Telegraphic
Tutwork London

Telephone
MONarch 2567 (3 lines)

Annual Subscription £3 5s. Single copy ninepence

Scaling Down

THE British National Coal Board has just released its "Revised Plan for Coal", the second such revision since 1950 when the Board's proposals for the long-term working of the industry were outlined in the original "Plan for Coal". This document was a general guide to investment policy and not a "blue print," and as was stated then it would need to be continually revised in the light of changing circumstances. What was not realized was the rapidity with which circumstances could change. As has been stated before in *The Mining Journal*, long-term forecasting of fuel requirements is at the best of times a precarious venture. So fluid is the situation at the moment that long-term planning is so wrapped up in "ifs and buts" as to be of limited value.

However, mining is always associated with the taking of risks, whether physical or economic. Even though the situation five years hence may well turn out to be vastly different from that anticipated, plans must be made now for results then. The industry is not a tap which can be turned on or off to give instantaneous coincidence of supply and demand requirements. The "Revised Plan for Coal" does, however, stress the flexibility it affords and indeed will be kept under review year by year.

If the Board's advisers are correct in their forecasting, the demand for coal in 1965 will be some 206,000,000 tons and the Plan accordingly provides for a total saleable output of 200,000,000 to 215,000,000, necessitating a labour force of 587,000 to 626,000. This compares with the 240,000,000 tons output envisaged in the 1950 estimate utilizing a labour force of 618,000 men. About 650,000 industrial workers are now employed in N.C.B. collieries and producing about 193,000,000 tons a year. The revised Plan anticipates a rise of some 5-6 cwt. O.M.S. by 1965, and indeed, if this is not forthcoming, coal's position in competition with oil will be much weaker. The problem of cutting back the labour force to that required in 1965 is fairly simple if one considers the country as a whole. National wastage frequently accounts for some 50,000 miners each year and so judicious control of recruitment could easily bring down the total number of employed. It is, however, inevitable that hardship will result in those areas where mining is the only local industry. It is estimated that by 1965 only some 550 pits will be in production compared with just over 900 in 1950 though many of the closures will be as a result of depletion of resources. Premature closing of several small producers is planned.

Such large-scale closures create one problem that does not get much publicity. Even a small pit has a manager and whilst it is relatively easy to transfer a coal filler or a haulage hand to another pit, redundant managers and chief engineers cannot be absorbed with such facility. Whilst a reservoir of experienced mining engineers will stimulate the fortunate ones still holding office, the immediate future for many qualified men must appear rather clouded.

Again, this situation will be reflected in a reluctance on the part of able young men to enter a contracting industry. Already this is revealed by the award this year of only 29 University scholarships out of the 100 annually offered by the Board.

If Britain's foreign aid programme is indeed going to be stepped up, it may seem to some of the younger executives an opportunity for helping to carry know-how or even capital goods to developing countries.

Taken overall, the dominant fact which comes out of this report is this: the Board do not envisage a crippling contraction of the mining industry. They are planning to meet a demand about equal to present production but with an increased efficiency. Coal will continue to be Britain's mainstay, with other fuels supplementing, not supplanting.

INTERNATIONAL STANDARDIZATION ACTIVITIES

A notable feature of the report of the British Standards Institution for the year ended March 31, 1959, is the attention accorded to international activities, with which a large section of the publication is nowadays concerned. Last year the B.S.I. had the responsibility of organizing the triennial Assembly meetings of the International Organization for Standardization (ISO), which, as customary, were held in the country of the president, Sir Roger Duncalfe, whose term of office expired at the end of last year. The meetings of the General Assembly and Council of ISO, together with meetings of 15 technical committees, were held in Harrogate and occupied a fortnight.

The first meeting of ISO's Technical Committee on Mining took place in Essen at the end of April, 1959. The meeting was attended by 40 delegates from 10 countries.

It was agreed that the scope of the committee's work should be as follows: (1) to establish agreement on specifications relating to machinery and equipment used in open-cast and underground mining for the extraction of solid mineral substances, but excluding the preparation and processing of the minerals; (2) to unify practice in the presentation of plans and drawings used in mine surveying; (3) to unify methods of calculation of mineral reserves and to unify terminology, the two latter tasks to be carried out in close collaboration with national and international organizations interested in this work.

Two working groups were established and began work. One is concerned with geological and petrographic symbols and the other (of which the United Kingdom holds the secretariat) will deal with components of conveyors.

The future programme of work is expected to include mine supports; wire ropes for winding and haulage; mine locomotives; tubs and mine cars; shaft guides; protective clothing and safety equipment; and certain aspects of flameproof equipment.

The fifth meeting of the Committee on Solid Mineral Fuels took place in Harrogate, when nearly 60 delegates and observers were present from 19 countries. Further progress was made towards reaching international agreement on methods for the determination of the physical or chemical properties of coal and coke. The meeting decided that the aim of international standardization must be to arrive, if possible, at a single approved method for each determination, but agreed, nevertheless, to continue the preparation of drafts for well-established alternative methods on the understanding that at each future meeting all of these should be reviewed and as many as possible eliminated. In view of the importance for many countries of the utilization of brown coals and lignites, it was decided to establish a new sub-committee on this subject, with Poland as Secretariat.

The committee on mica also met in June, 1958, and made progress with the draft on visual classification of muscovite mica. Further work on muscovite splittings was deferred to await a report from the U.S. on an investigation into this

subject. A document on methods of grading phlogopite mica is to be circulated for approval as a draft recommendation. Work on master standard samples and further work on phlogopite mica were deferred. A recommendation, ISO R 67, "Muscovite mica blocks, thins and films; methods for grading", will shortly be published.

The committee on manganese ore has prepared 14 draft recommendations covering various methods for the analysis of manganese ore, which were submitted to all ISO member countries during the course of the year. In addition, a draft recommendation covering the methods of sampling manganese ore loaded in freight cars has been submitted to all ISO member bodies. Six drafts covering further methods of analysis are in the final stage.

Belgium, as secretariat of the committee concerned, circulated draft ISO proposals relating to zinc ingots and zinc alloy ingots. The U.K. submitted its views on both these proposals. On the former, the U.K. commented that the six proposed grades of zinc should be reduced to four. A sub-committee to be set up will concern itself with the analysis of zinc and zinc alloys, and it has been suggested that the U.K. should assume the secretariat.

Agreement has been reached by the committee on copper and copper alloys on recommendations relating to classification of coppers, mercurous nitrate test, expansion test for tubes, and a specification for electrolytic copper.

In the section of the report dealing specifically with the British Standards Institution itself, it is noted that the scope of the revision of BS 413 "Steel tub wheels and axles", which had already been extended to cover other components of pit tubs, has been still further extended to include sections which deal with bodies and frames, pedestals, hooks and other items of drawgear in addition to the section providing improved standardization of fixed and loose wheels. Pit tubs have therefore been dealt with in their entirety. It is proposed that BS 413 be withdrawn when the new standard, the present title of which is "Small and medium rolling stock for mineral haulage", is published.

The scope of the revision of BS 889 "Flameproof electric lighting fittings (bulkhead and well-glass types)" has been considerably extended to provide for flameproof lighting fittings for use, not only in mining, but in other industries such as the oil and chemical industries. The difficulty of determining the best technique for bonding the plastics fittings to metal end rings remains unresolved.

A new committee has been set up to draft a glossary of terms used in the mining industry.

MINING PROJECTS IN AUSTRALIA

A major operation by Lake View and Star Ltd. is ready to commence production on a limited scale, reports our Australian correspondent. This venture is at the old Imperial Shaft on the southern edge of the Golden Mile. This shaft has been idle for 21 years, and was bought by the Lake View Company in 1937. When originally worked, the Imperial mine produced 748.78 fine oz. of gold from the treatment of 1,835 tons of ore produced above the 100 ft. level.

The shaft which is 500 ft. deep, has been unwatered and reconditioned. Geological mapping of the existing openings indicates the possibility of new orebodies being located as development of the main lode channel proceeds, and the company is hopeful of a reasonably high daily production and increased ore reserves. Stripping of good grade ore at the 200 ft. level has been commenced and preparations are in hand for operations at the 200 ft. and 400 ft. levels. There is a large area of virgin country which will be diamond drilled from underground drill sites. The shaft will be worked as

an isolated unit of the Lake View, for distance precludes any underground connection with other Lake View workings, and ore must be carted from the Imperial shaft to the mill.

The Premier of Tasmania is hopeful that exploratory work being carried out in several places will add new productive mines to the list of mineral producers. Three companies are at work: Rio Tinto Australian Exploration Pty. Ltd., Mount Lyell Mining and Railway Co. Ltd., and Electrolytic Zinc Co. of Australasia Ltd. Mineral areas have been discovered recently near the sources of the Wanderer River, in the vicinity of Macquarie Harbour, and the Government is constructing a road to the locality.

To encourage investigation of the rugged and inaccessible south-west corner of the State, large areas have been made available to the exploratory companies, following the practice in other parts of the Commonwealth, which is the only way successfully to attack mineral prospecting under present-day conditions. With the exception of Aberfoyle tin and Amosfield osmiridium there has been no important discovery of mineral in Tasmania for 70 years.

In the south-west corner of the Island, the Mount Lyell Company has planned diamond drilling in the Moore Valley, which is considered to be the most promising area so far found in this region. In the north-east, the Blue Tier country is held for exploratory purposes. Development of the Savage River iron ore occurrences is being considered. Drilling has disclosed extensive orebodies, but the grade is low for smelting, and tonnage so far indicated appears to be inadequate for an iron and steel enterprise. Drilling is to be commenced at the neighbouring Long Plains area, where geophysical survey has located an iron ore occurrence.

The State Government of Western Australia has plans for the utilisation of certain iron ore occurrences, provided the Commonwealth Government gives approval for export licences. It is intended to call for tenders for the mining and shipping of 5,000,000 tons of ore at the rate of 500,000 tons per year from the Koolyanobbing deposit, north of Southern Cross, or up to 10,000,000 tons from Mount Goldsworthy, at Ellarine Hills, 60 miles east of Port Hedland. In this case, the tenderer would have to supply loading wharf and dredge an approach. Profits from the enterprise would be devoted to water conservation and other improvement schemes. This idea is novel, but in view of the Commonwealth policy regarding Australian iron ore resources, it is very doubtful if export licences will be granted. Application for these permits will be made by the State Government if and when firm proposals have been received.

PROMISING MOLYBDENUM OCCURRENCE IN SIERRA LEONE

Scattered small occurrences of molybdenum minerals had been reported from time to time in Sierra Leone during the last twenty years, but it was not until 1951 that the Geological Department discovered rather larger quantities than usual to the north of the Sierra Leone Development Company's Tonkolili iron ore project in the Lake Sonfon area.

The first holes the Department dug were disappointing; but in 1956, helped by a team from the Royal School of Mines in Britain, they started to search the surrounding neighbourhood by geochemical means and found a patch of hillside where the soil was much richer in molybdenum than normal. Two slanting drillholes were bored this year to probe the rocks underlying the patch at vertical depths up to 450 feet. Cores of rock taken from the holes contain enough molybdenum and lead minerals for experts to advise further drilling in the hope of uncovering a mine.

Since faint indications of molybdenum are fairly widespread round Lake Sonfon, another team is flying out from

the Royal School of Mines next year to test stream and river water in about 150 square miles of country for molybdenum. The tests may pick out additional places in which to dig or drill for molybdenum minerals.

IRON ORE MAY BECOME LIBERIA'S LARGEST EXPORT

Iron ore is the most important of Liberia's minerals, and its exploitation already ranks as the major economic development in the Republic. In 1958 output totalled 2,218,600 tons. If present plans materialize as expected, the annual rate of production will rise very steeply in the next few years, and it is believed that by 1963 Liberia may have become the largest iron ore producer in the whole of the African Continent.

At the present time iron ore is mined exclusively by Liberian Mining Co. Ltd., at its Bomi Hills concession northwest of Monrovia. The ore is shipped through the free port of Monrovia, to which point it is transported over a company-owned railroad. The first shipment of iron ore was made in 1951, during which year 186,000 tons was exported. Annual shipments increased to about 1,300,000 tons in 1953 and to a level of about 2,000,000 tons in 1958.

The Bomi Hills iron-ore deposit is reported to contain some of the richest iron ore in the world. The high-grade ore, mostly magnetite, containing 68 to 70 per cent iron has been estimated at 50,000,000 tons. The total reserve, including the lower grade ore, is estimated at 300,000,000 tons. In 1957 Liberian Mining Co. completed and placed in operation a beneficiation plant and related facilities costing about \$8,000,000.

The greatest expectations, however, are centred on the vast and rich deposit discovered some 3½ years ago in the Nimba Range near Sanakole in the Central Province, where core drilling has already proved reserves of 230,000,000 tons averaging 60-70 per cent iron. The Government of Liberia has approved a plan for the development of this deposit by LAMCO (Liberian-American-Swedish Mineral Co.) and the U.S. Bethlehem Steel Corporation, which has purchased a 25 per cent interest in LAMCO. Total investment in the project will be in the region of \$200,000,000. Production is scheduled to start at the beginning of 1963 at an estimated initial rate of 4,000,000 tons or more. The project involves the construction of a railway about 160 miles long and mainly through jungle country. According to *East African Trade and Industry* the estimated cost is about £230,000 per mile, exclusive of traction or rolling stock. The terminus will be Buchanan, where a modern port is to be constructed at a cost of about \$65,000,000. LAMCO also holds concessions in the Bassa Hills near Harbel where a deposit containing ore of lesser quantity and quality will also be mined, as well as a third deposit at Putu in the Eastern Province.

Intensive geological studies have been undertaken by other companies to determine the economic feasibility of extracting ore from deposits elsewhere in Liberia. Mining is now planned by Landsdell Christie along the Mano River near the Sierra Leone border, involving a capital outlay of some \$15,000,000. Another deposit, situated in the Bong mountains, some 60 miles from Monrovia, is to be exploited by a West German combine, which includes Thyssen Hütte and Dortmund-Hütten Union. An investment of some \$90,000,000 is reported to be planned.

Although the iron ore in these deposits is reported to be of lower quality than that at Bomi Hills, the concessionaires nevertheless believe them to be important.

The annual production of iron ore in Liberia will reach 15,000,000 tons during the 1960's if the plans of these companies materialize as expected.

Vaal Reefs' World

VAAL REEFS' record shaft sinking rate of 922 ft. in thirty days—beating the Russian figure of 868 ft. and the previous South African record of Free State Saaiplaas of 834 ft. (both in 30 days of operation) is yet another advance towards mining's "four-minute mile"—1,000 ft. in a month, writes our South African correspondent. The breaking of the record was not deliberately gone for. In fact, the big push was designed for October when it was hoped to do the "plus 1,000 ft.". Sinking operations, however, went so well that the record virtually just happened. The depth now achieved puts this month out for a further attempt as the 2,000 ft. pump chamber has to be cut. However, all going well, South African mining circles tip November for the breakthrough. The record footage was between 1,132 and 2,054 ft. in a 28 ft. excavated diameter shaft (26 ft. within the lining). This compares with the New Boutoff colliery's 21.65 ft. diameter shaft (18 ft. lined). Free State Saaiplaas's shaft was 30 ft. excavated and 27 ft. 6 in. lined.

Sinking was done on nominal six-hour shifts, but the average worked out at 5 hrs. 15 mins. against 6 hrs. 28 mins. at New Boutoff and 6 hrs. 20 mins. at F.S. Saaiplaas. The best shifts at both Vaal Reefs and F.S. Saaiplaas were 4 hrs. 30 mins. Average advance per shift was 7.09 ft. at Vaal Reefs; 7.5 ft. at New Boutoff; and 8.1 ft. at F.S. Saaiplaas. The best

advance per shift at Vaal Reefs was 8.0 ft. and 9.2 ft. at New Boutoff. The best advance per day at Vaal Reefs was 39 ft. as against 40 ft. at F.S. Saaiplaas.

The total tonnage excavated was 55,240 tons, compared with 24,820 tons at New Boutoff and 51,900 tons at F.S. Saaiplaas. Thus by any standard Vaal Reefs' performance stands as the new world record.

Vaal Reefs No. 2 Shaft, has a planned depth of 7,200 feet. Excavation of the shaft collar started in May, 1958, and, thereafter, construction work on the collar and headgear occupied the period until July 2nd, 1959. By the end of August, 1959, the shaft had been sunk to a depth of 1,132 feet and during the record month it was advanced to 2,054 feet. Precementation was carried out in advance of shaft sinking and 51,325 pockets of cement were used in sealing off the water-bearing dolomites, which extend to a depth of approximately 1,600 feet. The success of this technique was evidenced by the fact that comparatively little water was encountered during the record month. After penetrating the dolomites, the shaft encountered about 20 feet of the Black Reef series and then came into the lavas.

The record performance can be said to have flowed from the planning done earlier aimed at obtaining the maximum sinking speed possible at Western Deep Levels. The success of this work was shown at that property where, after allowing for time lost due to cementation (nearly 40 per cent) the sinking rate in some months was equivalent to more than 850 ft. in 30 days.

A general view of the Vaal Reefs mine. This is the existing No. 1 shaft area. The illustration shows the headgear in centre, reduction works to right, and uranium plant in the centre background



Shaft Sinking Record

The investigations were headed by Mr. D. M. Bentley consulting engineer (technical development and design) to Anglo American Corporation. As a preliminary he made a careful study of existing practices in the Union to determine what bottlenecks existed which, if eliminated would reduce the duration of operating cycles.

Two specific ones emerged—mechanical cleaning and shaft lining. The traditional practice in cleaning had been for the operator to lower the grab "on brake" into the spoil at the shaft bottom in the belief that substantial penetration would take place. Study revealed that this was not the case, and apart from the waste of time, wear and tear on the grabs was heavy, increasing the amount of maintenance and adding unnecessarily to costs. To overcome this Mr. Bentley designed a new shaft cleaning engine which reduces the operation to a push-button system. The grab unit lowering motion takes place at a fixed speed, substantially the same as the raising speed. It has proved entirely successful on both properties. At F.S. Saaiplaas, the rated grab capacity was 300 tons an hour and 470 tons was the average rock handled per shaft. At Vaal Reefs the rated capacity was 240 tons and the average per shift was 425 tons.

As concrete lining has to keep up with sinking, the indications were that this could prove a limiting factor.

The Sinking Operation

A study of lining techniques suggested that time could be saved on installation and the removal of shuttering. The problem that had to be overcome was that operators had to perform a large amount of bolting both above and below the point where it could be done most efficiently and speedily. The solution was achieved by the provision of a movable platform within the stage as opposed to the previous fixed ones. At Western Deep Levels, two platforms are movable, but at Vaal Reefs one has proved adequate. The sinking platform is a Galloway stage, consisting of five fixed decks and one movable deck, the vertical distance between the top and lower decks being 52 ft. As a result of this, lining can keep pace with sinking. During the record month at Vaal Reefs lining completed amounted to 940 ft.

Lining follows approximately 80 ft. to 100 ft. from the shaft bottom, thickness being approximately 15 in. This concrete is poured through a 6 in. column from the surface, the concrete being mixed on surface in a batching plant. Shuttering is controlled from the stage. The whole operation takes place in 20 ft. and 40 ft. lifts.

Three hoists are being used in the sinking operations. A 5,200 h.p. hoist is the main sinking hoist, and will later serve as the permanent man hoist. In this equipment the two a.c. motors are rated 6.6 kV and are controlled by liquid resistances. Vanderbijl Engineering Corp., a South African company, supplied the mechanical parts to the design of Vickers-Armstrong (Engineers) Ltd. Ventilation for the shaft is provided by two Sturtevant 25,000 c.f.m. fans.

Four shifts, normally of six hours each, were worked around the clock each day for seven days a week. The actual operation cycle per shift averaged, however, approximately five hours, with the fastest cycle achieved of four hr. 30 min. The average advance per round was 7 ft. and the best advance

achieved in one day was 39 ft. The number of holes drilled per cycle was 170 and the average drilling time per round was 45 to 50 min.

A further contributory factor towards reducing time per round was the use of a new drilling machine which cut drilling time from the average of 75 min. a round at F.S. Saaiplaas to 46 mins. This was designed and manufactured by a South African company—Steel Engineering Co.—which specializes in this particular type of equipment. Its machines have been used in all record-breaking achievements since the first major breakthrough in this field at Vlakfontein in 1954 when the 585 ft. figure was set up. The drilling complement used to drill a round consisted of 32 Seco S27 machines.

Time was also saved by blowover operations being cut from 50 to 20 mins. a round as a result of the better ground existing at Vaal Reefs.

Vaal Reefs was also fortunate in that less pre-cementation around the shaft site was necessary. This was done from surface to a depth of 1,600 ft. through the dolomites, where Black Reef and Ventersdorp lavas followed. During the record month only 429 ft. of dolomites had to be penetrated. At the start 200 ft. of cover had been provided for the previous month's activities. Thereafter, cover was given by two 20 ft. pilot holes drilled each round. No time of significance was, therefore, lost through having to deal with bad ground. F.S. Saaiplaas, on the other hand, lost 2½ days as a result of a bad sidewall and drilling and cementation. The main hold-up at Vaal Reefs was due to the rope on one kibble "birdcaging" above a shackle. 10-ton kibles operating through two kibble openings in the stage are in use. In the record month, the best loading performance was 23 kibles in an hour.

1,000 feet per Month

From the above and a study of the operating statistics there can be no doubt that the 1,000 ft. figure can be broken soon. It is basically a question of there being little or no "lost time"—which is largely a matter of luck—and trimming the duration of rounds so that another three or four can be pushed into the 30-day period. Without any technical advances this should be possible as the Vaal Reefs' teams get further into the swing of operations, for last month was only the second one of full-scale sinking. Reducing the average round by 15 mins. to just over 5 hours would put the 1,000 ft. in the bag.

This cutting of time, however, obviously cannot be carried on indefinitely. The next major advance must rest in technical aspects. The present limiting factor is the rate of cleaning. The first move in this direction will be at Hartebeestfontein where it is planned to use kibles with a capacity of 15 tons against the present 10 ton ones in use. To allow for this, the sinking stages will have to be built to enable the kibles to pass through them. Even using the grabs now made with 20 cu. ft. capacity, cleaning will be accelerated.

The next step will be bigger grabs. At F.S. Saaiplaas a 30 cu. ft. capacity grab was tried out, but it was found that in the form used it was not as mechanically robust as the 20 footer. It is probable that this weakness will be overcome with the use of the Bentley shaft-cleaning machine. In addition, the combination of larger kibles and bigger grabs should

lead to still further improvements in average sinking performances in deep vertical shafts and place the 1,000 ft. per month target figure well within reach. What the record will be, of course, in a year's time can be only a matter of conjecture, but already the figure of 1,200 ft./month has been mentioned.

The Russian Achievement

A world shaft sinking record of 868 ft. in a month in No. 3 shaft at New Boutoff, Don Coalfields, U.S.S.R., announced earlier this year, is now substantiated by details of equipment and procedure appearing in *The South African Mining and Engineering Journal*, Vol. 70, No. 3474. Although this record, established during the month of April, 1959, has since been shattered as our correspondent has described at South Africa's Vaal Reefs, the Russian achievement holds much of interest.

The shaft is 18 ft. finished diameter, lined with reinforced concrete to a thickness of 20 ins. It was sunk through water-bearing sandstones, and shales by simultaneous sinking and lining, using the equipment type K.C. 1 m. This comprises a double-deck sinking stage rigidly connected to the top of a 70 ft. high steel shield having an external diameter of 18 ft. 9 ins. and suspended from surface on two ropes attached to the stage by swivels. Four guide ropes are used, these being attached on surface to counter weights of up to 20 tons each, which counterbalance much of the weight of the shield when this is required to be raised or lowered. At its lower edge, the shield carries a specially strengthened cutting shoe which

removes small protrusions on the shaft walls during the process of lowering. The stage is steadied against the walls of the shaft by four hydraulic jacks.

Cleaning is by a 14 cu. ft. cactus grab mounted below a suspension stage, which moves on vertical guide rails within the steel shield. The grab suspension stage is itself suspended, through a swivel, from a rope attached to a hoist on surface. Two single drum rock hoists work in conjunction with 106 cu. ft. buckets to give a combined hoisting capacity of around 130 tons per hour. The steel shuttering, collapsible and 10 ft. 6 ins. in total height, is suspended on four ropes by way of winches installed on surface. A curb ring is suspended separately from surface on 3 ropes, which act as guides for positioning the shuttering.

The aggregate weight of the K.C. 1 m. unit is 123 tons suspended on no less than 21 ropes. Concrete is delivered to the bottom through two 6 in. pipes in the usual manner. The labour force totalled 66 men.

According to plan, sinking should proceed at the rate of 6 ft. 6 in. per cycle in shale and 8 ft. 10 ins. in sandstone with 4 cycles per 24 hrs. The best advance per cycle was 9.2 ft. with the average at 7.5 ft. and per day 38.1 ft. averaging 27.9 ft.

It is considered that the K.C. 1 m. equipment could be used efficiently to depths of 1,300 ft. or more through rock formations which are sufficiently competent to avoid the possibility of loose pieces falling out and wedging the shield.

As long ago as 1957 it was reported that an advance of 869 ft. had been achieved in a sinking shaft in the U.S.S.R., but at that time the claim remained unsubstantiated.

Mount Isa Solves a Transport Problem

ONE of the biggest overland haulage contracts ever attempted is now under way in Australia—the movement of 1,000 tons of machinery more than 1,700 miles by a unique heavy-duty low-loader, which can travel on roads or rail tracks.

Complete power station and ore treatment units from the United Kingdom, some weighing more than 60 tons, are being carried from the southern seaboard to the famous mining centre of Mt. Isa in the north-east of the continent. Much of the route is through semi-desert or hot, sparsely populated cattle country, and each round trip by the low-loader will take weeks to complete. Eighteen months are expected to elapse before the contract is completed.

The electrical and mining equipment is being consigned to Mount Isa Mines Ltd. by British General Electric Co. Ltd., of England. After its 12,000-mile sea voyage it is unloaded at Adelaide, capital of South Australia. The equipment is needed for extensions to ore-treatment plants and for a 30,000 kilowatt turbo-alternator generating plant which are being constructed as part of a £25,000,000 development project at Mount Isa.

Mt. Isa, already producing more than half the copper and a big percentage of the silver, lead and zinc mined in Australia, has been handicapped in expanding by its remoteness and by the restricted capacity of a light 603-mile railway linking it

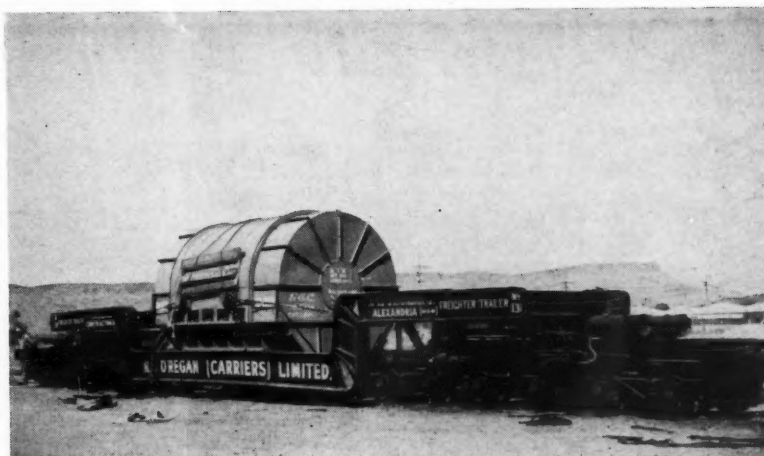
with Townsville, Queensland's Pacific Ocean port. "The Isa", as the huge mining centre with its satellite town of 10,000 people is known, is 1,000 miles from Brisbane, capital of Queensland, and 1,000 miles by air from Adelaide. Overland transport to these areas was, until this year, limited to lifts of about 25 tons. The development of the new super-low-loader, therefore, opens up a new era in the development of Australia's difficult northern areas. Factory-tested machinery, in single loads of up to 85 tons, can be brought in complete and ready for immediate installation.

Two years of investigation and research were required to solve the problem of delivering machinery in complete units to Mt. Isa. Routes from the closest large ports, Townsville and Brisbane, were impractical because both the connecting roads and the railways were unable to carry the big loads. Darwin, the capital of the Northern Territory, was almost as close and linked by first-class roads, but its wharves and cargo-handling equipment were found to be inadequate. Adequate port facilities existed at Adelaide, and both road and rail services could carry the required loads over the 1,700 miles to Mount Isa. However, lifting gear strong enough to transfer the loads from a road vehicle to a railway truck did not exist; 20 tons was the heaviest that could be lifted.

Since this route alone was capable of carrying the super-weight loads of equipment needed at Mount Isa, it was clear that a revolutionary type of heavy-duty vehicle must be evolved. The haulage contractors, R. H. O'Regan Pty. Ltd., of Sydney, the trailer manufacturing firm of Freighter Industries (N.S.W.) Pty. Ltd., British General Electric, of England, and engineers of the Commonwealth Railways

Mount Isa's isolation and the existing difficulties of transporting heavy equipment for more than 1,700 miles have led to the development of a unique road rail vehicle which could be of interest to other mining companies faced with similar problems

The low-loader as it appears when fitted with rail bogies



joined forces to design and construct a vehicle that would carry up to 84 tons without double handling at road and rail terminals.

The result was a 77 ft. heavy duty low-loader, a combined road and rail vehicle of exceptional strength and manoeuvrability. Its design was based on a conventional double goose-necked, well-deck, transporter modified, however, to enable the road bogies to be interchangeable with two types of rail bogies. Its construction costs £20,000.

Mounted on two sets of 32-wheel road bogies, the low-loader received its first heavy load, a 62-ton stator for the power station, direct from the cargo vessel Otaki on an Adelaide wharf early in February. The first section of its 1,700-mile journey comprised a stretch of 200 miles of good highway to Port Augusta. From there, northwards to Alice Springs, however, was 870 miles of unsealed road, often just a track menaced by shifting sand dunes and subject to flash floods during infrequent heavy rain.

At Port Augusta, therefore, the low-loader became a rail car when the 64 wheels, fitted with 8.25 x 15 balloon tyres, were replaced by 4 ft. 8½ in. gauge rail bogies for a 321-mile stage to Maree, where the rail gauge changed to 3 ft. 6 in. There another set of bogies was fitted for the remaining 540 miles to the railhead at Alice Springs. The change-over necessitated raising each end of the low-loader in turn with enormous hydraulic jacks, unhitching the bogies and substituting the set required for the next stage of the journey.

The conversion from road to rail was made in about five hours. At Alice Springs the low-loader, with its 62-ton burden still undisturbed, again became a road vehicle.

There is no rail link between Alice Springs and Mount Isa, but northwards from Alice Springs the war-time built Stuart Highway—1,000 miles of bitumen, slices through the middle of the Northern Territory to Darwin. At about one-third of the way to Darwin, near the gold and copper mining centre of Tennant Creek, the Barkly Highway branches eastward to Mount Isa. The final 720 miles is over roads as good as any in Australia.

Powered by two prime-movers, one pulling and the other pushing, the three-vehicled unit averaged 135 miles a day on its first trip through these lonely stretches.

The total length of the unit is 130 ft., the longest road loader in Australia. Travelling with it are scout cars to warn traffic of the approaching convoy, prime movers and an auxiliary low-loader and truck carrying 12 tons of fuel, spares and other gear. Total equipment of the convoy is worth £57,000.

In spite of its size and huge load, the low-loader has proved very manoeuvrable. Hydraulic power steering at front and rear, with one prime mover pushing and the other pulling, can turn the total length of 130 feet in a circle of 100 ft. diameter. The braking system can lock all 64 wheels at 20 m.p.h. with a 60-ton payload. An air-cooled diesel auxiliary engine mounted on the rear dolly of the low-loader supplies the hydraulic power.

The low-loader when equipped for road transportation duties



Ore Mining in Poland

SINCE the war Poland's metal-working industries have developed at a faster pace than her ore mining, the expansion of which has been checked until comparatively recently by lack of full exploration of raw materials resources. The benefits are now, however, beginning to be felt from the extensive geological prospecting begun in 1950, and with the discovery of new deposits of iron, zinc-lead and copper ores and of new resources in mines already in exploitation, the way is open for an improved rate of development.

Organisation of Ore Mining

The mining of ore is mainly undertaken under the auspices of heavy industry. At present 41 mines are in operation, and nine are under construction. Ore mines are classified according to size as large (employing 2,000-4,000), medium (1,000-2,000 employees) and small (under 1,000), with small mines predominating. These small mines are grouped to form larger complexes, while the large ones are linked with enterprises for ore concentration to create mining-metallurgical combines. Zinc-lead and copper ore mines are associated in the Non-Ferrous Metals Mining and Metallurgy Group, and iron ore mines form an Iron Mining Association. There are two geological undertakings concerned with ore prospecting, a research institute for technological development studies and two design offices producing documentation for the construction of new ore mines. Actual construction is in the hands of a specialized agency for building of ore mines.

Iron Ore

In 1939 in the then territory of Poland 38 small iron ore mines were functioning, producing 942,000 tons p.a. In 1945, only seven mines were in a state to be worked. During that year a further eleven flooded iron ore mines were restored to production, and output amounted to 105,000 tons. This rose in 1946 to 250,000, in 1949 to 680,000, and by 1958 had reached 1,864,000 tons. Since 1950, construction of 15 mines having a total planned capacity of 2,800,000 tons of ore p.a. has been initiated. The tendency is towards the predominance of larger mines having productive capacities of 240,000 tons and upwards.

Iron ore mining is concentrated in three areas, the main one being centred on Czesochowa, which today produces about 1,500,000 tons annually. The Czesochowa ore is siderite, with an iron content of 30 per cent, and 17 per cent silica. Next comes the Kielce region, where siderite occurs in lias formations, lying between loams and slates (27 per cent Fe, 20 per cent SiO_2). Also in this area, there are ferruginous sands round Tychow; two strata of limonite having a 14 per cent iron content. Owing to high silica content and high extraction costs, further expansion of the Kielce mines is not envisaged. Finally, there is the newest region, Leczyca, where two strata of basic siderite ores, one with 30 per cent Fe and the other with 20, were discovered a few years ago. Two new mines began production here in 1957, and will ultimately yield 300,000 tons p.a.

In the light of the situation above outlined, it seems likely that home-produced iron ore will supply about 25 per cent of the needs of the Polish iron and steel industry in the course of the next few years, the remainder of the requirement being met from import. Meantime, intensive prospecting for possible richer deposits will continue, and increased mechaniza-

Condensed from an article by M. Eng. J. Jedruch, in *Przegląd Techniczny*, 33, 1959

tion will be introduced in mines—including complete replacement for underground transport of diesel locomotives by contact electric cars.

Zinc-lead Ores

At the end of the 19th century in Poland the technique of processing the blende and smithsonite ores occurring in the Bytom basin was mastered. Washing plants were built, but the concentration achieved was unsatisfactory, leaving 5-8 per cent Zn in the waste. Today these zinc-containing waste heaps are being re-processed in rotatory and flotation furnaces. In addition, the prospecting undertaken since 1950 has revealed the existence of important resources of zinc ores in the triassic dolomite of the Bytom and Olkusz-Chrzanowski basins. The main ores appearing are blende, galena and smithsonite, and traces of silver, cadmium, indium and germanium occur. In the getting of zinc-lead ores, a system of collapsing is employed, which is equally applicable in new mines and in removal of ore-containing sustaining pillars in old ones, with hydraulic and compacted stowing.

The danger of flooding is the major problem in zinc-lead mines, which have to have pumping systems with double power resources and 200 per cent reserve. In the course of the next few years the mines at present under construction will come into operation and work will begin on two new ones. By 1965 extraction of zinc-lead ores should be 65 per cent up on 1959, and the quantity of zinc in the concentrates should have risen by 51 per cent.

Copper Ore

Mining of copper ore on a large scale in Poland began only after the Second World War, when she regained in Lower Silesia two flooded copper mines and one under construction. Today three are working and a fourth is being built. Deposits of bornite, chalcocite and chalcopryrite occur in the outer-Sudeten basin in Lower Silesia, in the form of thin strata associated with limestone and marl. Resources so far recorded will ensure the working life of these mines for about 60 years. From the technical point of view the copper mines are better-found than the zinc mines. The seams of ore are extracted by the longitudinal wall system, and by transverse wall working with hydraulic stowing. Experiments are in progress on ore-getting by collapsing, using moveable steel supports, and have given good results, reducing both exploitation losses (from 20 to 10 per cent) and production costs.

In recent years new deposits of copper ore have been found in the Lubin-Sieroszowice region, which offer good prospects for the further development of the copper industry on the basis of richer raw materials. The tectonic and hydrological conditions seem likely to be difficult, though full details will not be available till completion of geological studies in 1961. It is, however, established that the deposits warrant the construction of mines with an extraction of two to three million tons each, and building of the first one will start in 1960. Modern techniques, including shaft sinking by the process of freezing the ground, will be fully employed and it is expected that construction will take eight to ten years.

Machinery and Equipment

The Friable Core Problem is All Wrapped Up

The difficulty of transferring drilled friable cores from barrel to box without damage and as nearly as possible in their original state, has been a problem that has bedevilled drillers and geologists for many years. In the early days of October, however, Turriff Construction Corporation Ltd., revealed to the Technical Press a device that would seem to have eliminated the problem.

The answer is a Polyester film that is secured within the inner barrel during coring. With simplicity as the keynote, the Polyester in many cases is merely rolled to tubular shape, placed in the inner barrel, and left to form its own diameter. It is then secured. After drilling, the core is removed complete; appearing as a unit wrapped in a plastic sheath that is made good by adhesive tape at 6 in. intervals as it is withdrawn from the barrel. In previous trials 100 per cent core recovery was reported. The recent Press visit took place during actual operational drilling.

To date depths reaching a maximum of 300 ft. have been negotiated successfully, but as the plastic sheath is actually a lining to the core barrel itself, the company feels that the method could be used at any drilling depth. The company further suggests that Polyester film wrapping could be employed successfully with air, water or mud flushing.

Turriff developed an interest in the core recovery problem when operating for the Opencast Executive of the National Coal Board. Experiments aimed at finding a solution began some two and a half years ago, and although the use of a plastic sheath may appear as a simple answer, it is significant that amongst the many ideas tried and rejected during the trial period were the injection of petrifying liquid, split inner barrels and a large and assorted variety of receivers.

The first experiments with plastic sheaths were not successful. However, Imperial Chemical Industries Ltd., produced at this time a Polyester film named Melinex. The most difficult of all the problems associated with the new development was the fixing of the sheath

within the inner barrel in such a way that it would be secure during coring but easily removable when required. Eventually a simple collar and clip were evolved. At first this unit proved satisfactory when used with plastics of 3-4 thou. of an in. gauge. Under these conditions, recovery of cores taken through friable coals and clays proved very good.

By the spring of 1959, although it was known that the method of holding the sheath in the barrel was efficient, further tests on the actual sheath material were deemed necessary.

Unfortunately, thicker gauges of Melinex were not available in the U.K., but the same Polyester film, marketed under the trade name Mylar, was available from du Pont in the United States and in thicknesses up to 10 thou. This proved completely successful. Tests with thinner films manufactured by du Pont are proceeding at the moment, and will be extended to those made by I.C.I. as these become available, the drawback with 10 thou. Mylar being that it is not completely transparent.

As a provisional patent application was granted as recently as August, one commercial application only is reported. This was a series of seven seams taken from the coal measures of the Ashby-de-la-Zouch, Leicestershire, area. The result was successful, the quality of core recovered from notoriously difficult seams

being far higher than had previously been achieved by any other means.

By use of the new method it is possible — and indeed usual — to measure strata thicknesses to $\frac{1}{4}$ in. in the most friable formations. The operational drilling at Coalfields Farm Site, Ashby, has revealed the advantages of the new sheathing method, whereby cores are preserved in original order and condition, preservation is indefinite, and transportation of the complete core a simple operation.

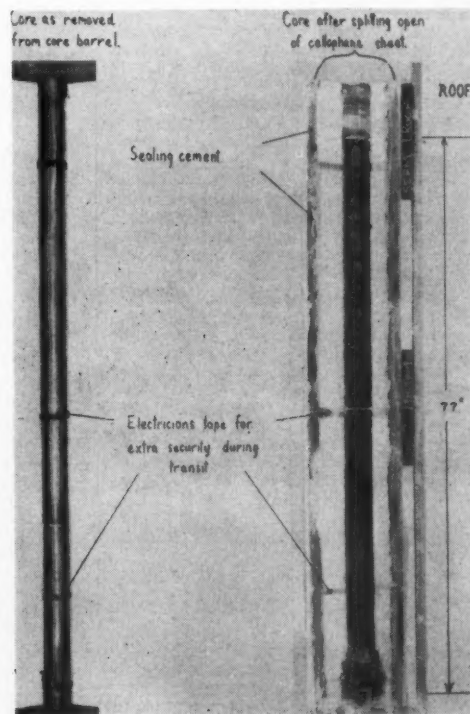
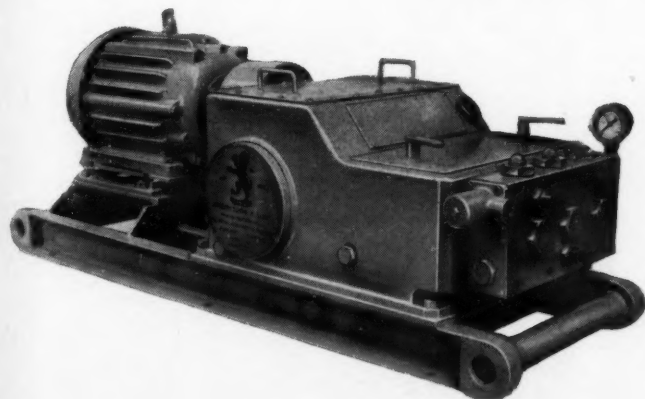
The two drills in use on the Coalfields Farm Site were a Reich Model 600 and a Boyles BBS 20 A/W rotary rig.

MINING HYDRAULIC PUMP

For several years, since the inception of face mechanization involving the use of hydraulic power, Joseph Evans and Sons have supplied considerable numbers of hydraulic pumps. The company's latest design is specifically developed as a mining hydraulic pump.

The pump is a $1\frac{1}{2}$ x 2 in. horizontal triplex plunger type, and is capable of delivering 5 or 7.5 g.p.m. against pressures up to 1,500 p.s.i., depending upon motor h.p. and speed. It will handle water, water/soluble oil mixture or hydraulic oil. The crankcase is of fabricated steel construction and fully

At right is core removal at the Coalfields Farm site by Turriff. On the left hand side is seen the core as removed from the barrel, while at right is the core after the protective sheath has split open. Below, mining hydraulic pump by Joseph Evans and Sons



Transverse flaps of the Birtley "Hi-Grad" conveying system

stress relieved. It is totally enclosed with a positive lubrication system and a special design crankcase breather ensures that dust and condensate cannot possibly enter the crankcase. The worm drive is incorporated inside the crankcase and the crankshaft and worm shaft run in ball/roller bearings. Renewable crosshead guides are provided.

The pump block is of forged steel with hard bronze valves and renewable seats, and nitralloy pump plungers. Cast steel stuffing boxes have self-expanding vee type gland packings. All wearing parts are easily renewable and special attention in the design has been paid to accessibility. A fully flexible coupling is fitted with a heavy gauge guard. The pump will operate equally well in either direction of rotation, and a slight deviation from the horizontal will not affect the efficiency of the lubrication system. A skid type steel baseplate accommodates pump and motor. The overall width is only 22 in. As optional extra, a heavy mining type pressure gauge, relief valve or unloading valve, and suction filter can be provided. This pump has been fully tested and proved on actual underground working conditions.

\$500,000 ALUMINA PILOT PLANT

North American Coal Corp., Cleveland, Ohio, is financing construction of a \$500,000 pilot plant in the Buffalo area for the manufacture of alumina and aluminium sulphate from mine waste. Since North American first announced this research project a year ago, it has successfully completed laboratory work with Strategic Materials Corp. of Buffalo. Results from the pilot operation will determine the likelihood of a commercial plant for production of high-purity alumina. North American and Strategic Materials have jointly organized Strategic-North American, Inc., to exploit the new process.

THE "HI-GRAD" CONVEYOR

A new design for the elevating of granular materials by belt conveyor in restricted locations has recently been introduced by Birtley Engineering Ltd. This design, the Birtley "Hi-Grad" conveyor, can operate at angles up to 50 deg. and thus avoids the need for complicated and expensive conventional conveying layouts.

The basic features of the Birtley "Hi-Grad" are a lower, carrying, troughed belt and an upper, retaining, belt, the latter being fitted with transverse flaps. The material being conveyed is constrained between these two belts, a common drive being employed for both. Feed on to the conveyor is by means of a rotating transfer drum fitted with an automatic material flow control, which ensures a delivery from the feed hopper to the carrying belt only when the conveyor is running.

In one typical application the conveyor is elevating 250 tons per hour of sand or variously graded aggregate at an angle of 35 deg. from a ship discharge point to a Winget Ready Mix Plant. The conveyor will handle effectively finely powdered materials, grains and lumpy materials and, in cases where there is a



tendency to adhere to the conveying surfaces the carrying belt can be cleaned by means of a conventional scraper at the head end. High capacities are achieved and power consumption and maintenance are at a minimum when compared with other methods of steep angle elevating. The use of special belts is avoided and consequently there is no problem of spares replacement anywhere in the world.

GISMOS TAKE OVER IN MINE MUCKING

Recent reports in the Technical Mining Press of the United States emphasize that many of the engineers planning new mineral and metal mine installations there make it a speciality to establish the complete system around three new basic machines—the self-loading dirt transport, the drill Gismo, and a tractor. With these fundamental items of mining equipment, a crew of 10 underground specialists is able to produce fully 20 tons of material per shift.

Tennessee zinc and limestone producers have found that development of underground deposits formerly uneconomic to exploit, is now proving profitable. One fact in favour of the Gismo is the relatively low initial investment required for the equipment.

Still another obvious advantage is the saving in manpower with the Gismo handling spare. In one operation, one man loads and trams the ore to disposal points. Should the shuttle cars be used with a loader, a second man is required. In low veined operations the rig can function efficiently in 7½ ft. headrooms.

Mucking is the basic job for which the Gismo is designed. One man operating controls from the Allis Chalmers HD-6

tractor mucks out a heading and transports the muck to one of the 6 ft. x 9 ft. transfer raises. No grizzly is used over the raise so that when the bottom dump hopper moves over it, all of the load drops out.

The Gismo operates by scooping rather than on a crowd and dig principle. The tractor eases the Gismo, with the 80-in. wide bucket lowered, into the muck pile. The forward motion of the unit crowds muck to the back of the scoop. When the dipper is raised to maximum height, the forward half of the hopper floor is also elevated, which forces the muck to the rear of the hopper and clears the scoop. The operator backs the unit up slightly, then takes another bite at the pile. About seven or eight passes are needed to load the unit to capacity.

In driving sub-level development drifts, a Gismo jumbo, a Gismo self-loading transport, a tractor, an incline ramp, any required number of automatic dumping hopper cars, a locomotive and track will produce with a two or three man crew advancement per man shift that will give very low cost for developing operations. The Gismo is revolutionizing rock excavation methods and rock transport methods in much the same manner that earth-moving machinery has revolutionized that type of work.

The American Limestone Co. operates the above named equipment, plus end dumping Diesel powered trucks for the haul up the 4 per cent grade to the rail cars on the surface. There the Gismos load from two levels, the one where they are located, and the sub-level above, the rock coming down through two raises. They prove very effective machines for loading out large boulders to set aside for "Dobey shooting" or for "popping" with holes to their centres.

MINING MISCELLANY

Work is proceeding on the construction of a dry coal screening plant in Obilic, Kosovo-Metohija region, Yugoslavia. The annual capacity will be about 1,500,000 tonnes. Later it will be increased by another 1,000,000 tonnes. This will be the first plant of its kind in Yugoslavia. It has been designed in the country and the equipment will be made in domestic factories. An opencast lignite mine is also being opened in Obilic. It will have an initial output of 1,000,000 tonnes of lignite a year, which will eventually be stepped up to 3,000,000 tonnes.

Plans for the establishment of a joint Cyprus-Israel copper refinery in Haifa were referred to in our issue of September 18, 1959, p. 265. The latest advice from our correspondent in Israel emphasizes that the whole project is still at a very early stage. All that can be stated at present is that a company has been formed under the name of Israel Mineral Processing Industries Ltd., and that a suitable site has been assured for the erection of the proposed refinery at the Kishon Harbour area, near Haifa, where a free zone—the first one in Israel—will be created. Negotiations for the final arrangements have still to overcome a number of difficulties. Our correspondent also states that the government will participate to the extent of £1,500,000 Sterling and that the total investment will amount to £4,000,000 Sterling. If the plant is carried out as envisaged, there will be an initial production of 90,000 tons a year. The project will include a flotation plant, a sulphuric acid plant, a roasting plant, and a superphosphate plant. The final outcome of the negotiations is still awaited.

The magnitude of the engineering feat described on page 364 is revealed by this photograph of the Stuart Highway, 1,000 miles of bitumen, that runs north and south through the centre of Australia between Alice Springs and the port of Darwin. On this road the low-loader carrying machinery consigned to Mount Isa Mines Ltd., covered more than 170 miles in a day carrying a 61-ton load



An exploration programme shortly to be launched in the Saguenay River area of Quebec, within 15 miles of the world's largest aluminium producing plant at Arvida, has for its basic objective a possible multi-million dollar iron mining project combined with the commercial production of phosphate, if the potential tonnage proves sufficient to warrant it. The project is sponsored by the J. H. Hirshhorn interests, best known for their discovery and development of the Blind River uranium field. There are known deposits of titaniferous magnetite on the property, some of which contain appreciable quantities of excellent grade apatite. The magnetite grades from 36 to 50 per cent iron. Metallurgical tests have indicated the possibility of producing high-grade iron ore. A company known as Grand Saguenay Mines and Minerals Ltd., has been formed to carry out the work.

At the annual meeting of the British Newfoundland Corporation, the retiring chairman, Mr. B. C. Gardner, stated that the company's exploration subsidiary, Brinex, and its associates has found several new mineral-bearing areas this summer under favourable geological conditions. These include occurrences of asbestos fibre and copper mineralization in Labrador and copper-bearing and lead-zinc mineralization in Newfoundland. Further investigation is being undertaken. Mr. Gardner is being succeeded as chairman of Brinco by Mr. H. Greville Smith, but will continue as a director.

The Crown Agents for Overseas Governments and Administration have awarded to Fairey Air Surveys a contract for aerial photography of an area of

17,200 sq. miles in Eastern Uganda in the region of Lake Victoria, on the Equator.

A geological survey of an area extending to 90,000 sq. km. in the Nanling Mountains in Southern China is nearly complete; coal and other minerals have been found. A three-year soil survey of the Yangtze basin has been completed.

It is reported from Russia that large bauxite deposits have been discovered on the middle reaches of the Angara River in Eastern Siberia, and also on the Bakhta River.

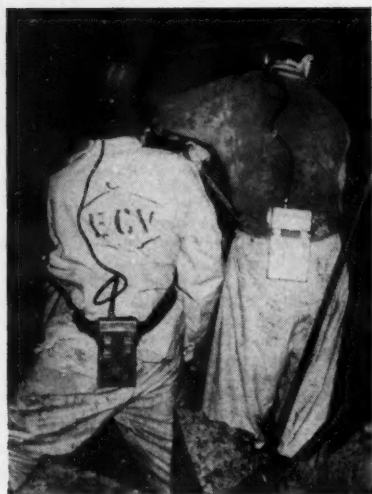
The Thailand Mines Department has announced that a joint Thai foreign company, known as the Oawa Kham Tin Company, is attempting to mine tin ore from the sea off Phuket Island in southern Thailand. The capital of this company is 1,980,000 Malayan dollars, of which the Thai government holds 35 per cent, and private Thai citizens 12 per cent, the remaining shares being held by British and Malayan interests.

Fairchild Aerial Surveys, Inc., an American company, has signed a contract with the Moroccan Government for making a geological survey from the air. The programme will cover 22,000 sq. miles in three months and cost \$206,000. Two aircraft, equipped with magnetometers and recording apparatus, will survey three separate areas: the Beni Bou Ifrur near Nador iron ore deposits; the High Plateaux south of Oujda; and the Tafilalet oasis in eastern Morocco. According to Mr. Douglas B. Lindsay, director of the Société Air Carrier du Moghreb, a subsidiary formed in Morocco by the Fairchild company, data obtained during the survey will be used by the Moroccan Department of Mines and Geology to find iron ore deposits in the Nador and Tafilalet areas, and to determine the geological structure of the High Plateaux with a view to eventual prospecting for oil, coal and water supplies. Special importance is attached to the discovery and evaluation of new iron ore deposits in view of the government's decision to establish a steel industry using the Republic Steel-National (R-N) process.

The Venezuelan Ministry of Mines and Hydrocarbons has confirmed that the government is preparing a new policy for the exploitation of Venezuela's iron ore reserves. The deposits will be controlled by the government and no further exploitation concessions will be granted for the time being.

The Guatemalan Ministry of Economy has granted operating rights to a new firm, Arenas Titaníferas del Pacifico, to exploit titanium, iron and other ores found in the black sands of the Pacific Coast. The concession, for a 25-year period, grants exclusive rights in specific regions of the south coast.

It is reported from Spain that the Colmenar Viejo region of Madrid province has been declared a State reserve for the exploitation of radioactive minerals.



Tunnel builders on the Kiewa hydro-electric project in the Australian Alps. Under regular working conditions rubber-coated clothing lasted from three days to a week. After the neoprene-coated garments worn by the workers were adopted, wearing time jumped to eight weeks and longer. The neoprene suits are three pounds lighter than those worn previously

Neoprene-coated suits are now being issued to workers on the Kiewa hydro-electric project of the State Electricity Commission of Victoria, Australia. Workers engaged on building tunnels on the 4,000 ft. descent of the Kiewa River found that rubber-coated clothing lasted at most one week, owing to deterioration from oil, air and water blowing back under pressure from air drills, and the abrasive action of rock particles. Neoprene clothing can last up to eight weeks in the same conditions, and the ease with which small tears can be patched is an added advantage.

The Pulacayo lead-zinc-silver mine in Bolivia is to be flooded, after 126 years of continuous exploitation. The mine's reserves have now run out and it has been inactive since June. All equipment is to be removed before flooding. This has been announced by the Bolivian Mining Corporation, which manages the country's nationalized mines.

Considerable development is reported to be taking place in the prospecting work near Glogow, Poland. Results available to date prove the existence of copper deposits which are reputed to be among the biggest in Europe. Construction of the first shaft will begin next year, and it is expected that three big mines will be opened in the area, while industry expects to receive the first supplies of ore about 1965.

In the department of Los Andes, Salta Province, Argentina, Fabricaciones Militares has brought into operation a modern plant for the refining and concentration of sulphur, which will supply 40 per cent of Argentina's present consumption. The plant is situated at an altitude of 5,600 m. above sea level, in an inhospitable region swept by violent gales, and with temperatures often as low as 18 deg. below zero.

A consortium of North American firms has started a series of investigations into the possibility of exploiting uranium in the province of Salta, Argentina. A contract has been signed with the National Atomic Energy Authority.

On October 15 a special exhibition of aerial photographs of quarries and mines was opened at the Geological Museum, Exhibition Road, South Kensington, London, S.W.7. It will remain open for several months. The photographs show past and present surface aspects and effects of quarrying and mining in the United Kingdom. The exhibition illustrates the great variety of useful rocks and minerals found in this country. All the photographs are from the Cambridge University Collection and have been taken during recent years by Dr. J. K. St. Joseph, Curator in Aerial Photography at Cambridge, from Aircraft of the Royal Air Force on training flights.

PERSONAL

At the annual general meeting of British Standards Institution, Mr. R. E. Huffam was re-elected for a second term of office as President. Mr. Huffam is also chairman of B.S.I.'s General Council. Sir Roger Duncalfe, Sir Herbert Manzoni and Mr. John Ryan were re-elected deputy-Presidents.

Mr. David Douglas, B.Sc., M.I.Min.E., has been unanimously elected president of the South Wales Institute of Engineers for the session 1959/60, and was installed in office at the 101st annual general meeting held in Cardiff on October 15.

The Percy Nicholls Award, a joint honour of the American Institute of Mining, Metallurgical and Petroleum Engineers and The American Society of Mechanical Engineers, will be presented to Dr. H. H. Lowry "in recognition of outstanding achievement in the field of solid fuels". The presentation will be made on October 28 during the 22nd Annual Joint Fuels' Conference in Cincinnati, U.S.A.

Mr. Eugene R. Black, president of the World Bank, has announced the appointment of Mr. Robert W. Cavanaugh as treasurer of the Bank. Mr. Cavanaugh succeeds the late Mr. Henry W. Riley, who was treasurer of the Bank from January, 1953, until his death in September, 1959.

British Insulated Callender's Cables Ltd., announce that Mr. F. V. Thompson, F.C.I.S., A.A.C.C.A., has been appointed director of personnel, and has relinquished his position as secretary of the company. Mr. J. P. Hourston, B.Com., C.A., who has been assistant secretary since 1946, has been appointed secretary. Mr. C. H. Frankland, M.I.E.E., has retired from the board of B.I.C.C., and Mr. R. Betley has been appointed an executive director.

Mr. J. H. Osborn, a director of Samuel Osborn and Co. Ltd., has been elected M.P. for the Hallam Division of Sheffield.

Armstrong Whitworth (Metal Industries) Ltd., announce the appointment of Mr. Ian Robinson as technical representative to cover their complete range of products in the Sheffield area.

Metals and Minerals

Titanium

The latest statistics released by the Bureau of Mines, U.S. Department of the Interior, indicate that the recovery in the titanium industry, noted earlier in the year, was fully maintained in the second quarter, when consumption was the highest reported in two years. As compared with the first quarter, production of sponge metal rose from 1,205 to 1,449 s.tons and consumption from 1,258 to 1,391 s.tons. Production of ingots improved from 1,842 to 2,171 s.tons and consumption from 1,740 to 2,219 s.tons. For the first six months of 1959, total titanium mill production aggregated 1,919 s.tons as against 1,317 s.tons in the first half of 1958.

An impressive insight into titanium's potentialities as a corrosion-resistant material is afforded by the details now available of the special equipment installed by Freeport Nickel at its new nickel extraction plant in Moa Bay, Cuba. As previously reported in this journal, this equipment accounts for the largest single commercial order for titanium so far placed, amounting to nearly 15 tons.

Titanium proved to be the most practical material capable of resisting the highly corrosive and eroding slurries of cobalt, nickel and sulphuric acid at high temperatures and pressures. It was accordingly specified for draught tubes, valves, piping, internals and nozzle linings for the 55-ft. leaching reactors, weighing 106 tons. Titanium was used for the "bleed steam" system for the reactor vessels to overcome a critical stress corrosion problem that occurred in all highly stressed zones. Another use involved the method of bringing a sulphuric acid injection line to and through the reactor vessel. In this case, a stainless steel pipe carries the acid to the vessel, where it is joined by a plate flange to a titanium "armour" pipe inside. Another notable application is in the "cooler-boiler" unit—a shell-and-tube heat exchanger operated like a low-pressure fire-tube boiler—in which titanium is used for the tubes.

The titanium grade utilized in almost every application was RS-55—an intermediate strength grade of commercial purity, supplied by Republic Steel Corporation.

On both sides of the Atlantic new titanium alloys continue to be announced. New materials added this summer to the production range of wrought titanium and titanium alloys of Imperial Chemical Industries' Metal Division comprised two grades of commercially pure titanium and two titanium alloys. With these additions there are now six grades of commercially pure titanium available in the U.K. The softest and most ductile has a maximum tensile strength of 26 tons/sq. in. with a minimum proof stress of 13 tons/sq. in. The strongest has a tensile strength of 40-50 tons/sq. in. with a minimum proof stress of 30 tons/sq. in. All grades can be bent round a radius of 1 T, except the strongest, which has a bend radius of 2 T.

Despite some revival of interest in rutile on the part of European consumers,

Aluminum Bay

by the
ment of
recovery
earlier in
in the
on was
rs. As
produc-
2,205 to
from
a of in-
l s.tons
2,219
of 1959,
egrated
s in the

anium's
resistant
ils now
ipment
its new
a Bay,
in this
for the
er for
ting to

practi-
ng the
ries of
acid at
It was
tubes,
zle lin-
reactors,
as used
for the
critical
urred in
her use
a sul-
through
a stain-
the ves-
ange to
inside.
in the
nd-tube
a low-
which

almost
an inter-
mercial
el Cor-

ic new
ne an-
ed this
nge of
loys of
Metal
f com-
two tita-
as there
ly pure
The
ximum
n. with
ns/sq.
strength
inium
t. All
dius of
has a

in rut-
sumers.

prices remain little changed, due to the unfavourable statistical position of the ore. Many rutile dealers' ideas now range from £28 10s. to £29 10s. per ton c.i.f. Europe for minimum 95 per cent material, compared with £29 and £30 previously. The limited extent of the movement, however, serves to underline the impression that prices are unlikely to record any significant downward change at prevailing low levels. Some producers are reluctant to sell at today's prices, especially as there seems to be a growing belief that in the course of the next few months buyers may well begin to show more interest as a result of having worked off most of their big purchases of three years ago. Current price indications are for fairly early shipment, distant shipment being indicated at a higher level.

It remains to be seen what success shipowners will meet with in their efforts to secure higher freights, which could have an appreciable bearing on future rutile prices.

A plant to refine ilmenite is under construction at Pulmoddai, some 40 miles north of Trincomalee on the east coast of Ceylon. The complete project will cost the Government Rs. 8,000,000. Two Japanese experts are supervising the work personally. A pilot plant to carry out experiments is being installed and it is hoped to start commercial production in July next year. The expected output of refined ilmenite is 60,000 tons per year. Excavation of the mineral beach stand, containing 75 per cent ilmenite, is proceeding at the rate of 50 tons per day.

ALCAN INCREASES PRODUCTION

Aluminium Ltd. is increasing its Canadian output of primary metal by reactivating some of its idle pot lines. Total annual production will be increased by 35,000 tons from the present level of 530,000 tons, reflecting a slight improvement in market conditions. Of the 35,000 tons annual increase, 17,000 tons will come from the Arvida, Quebec, smelter, 10,000 tons from Shawinigan Falls, Quebec, and 8,000 tons from Kitchik, British Columbia. The increased output at Shawinigan Falls and Kitchik will be effected fairly soon. That at Arvida will take a little longer.

It has been further reported that Alcan is planning to spend between \$4,000,000 and \$4,500,000 to increase its water supply for hydro-electric facilities in the Lake St. John region of Quebec. The company has stated, however, that this work does not mean that it is resuming the hydro-electric expansion programme which was postponed two years ago, when demand for aluminium slackened. The only purpose is to increase the water supply for existing facilities.

As from October 1, new corporate names of companies in the international sales organization of Aluminium Ltd. became effective. The Central Sales Management Co. is now Alcan International Ltd., and the seven regional sel-

ling companies operating throughout the world similarly incorporate Alcan in their formal titles.

The regional sales company in the U.K.—formerly known as Aluminium Ltd., but now as Alcan (U.K.) Ltd., is reported to be embarking upon an extensive advertising campaign in daily and Sunday newspapers. The first advertisements, which will occupy large spaces, are to be devoted to promotion of the use of Alcan aluminium for building purposes, windows, and curtain walling.

Yugoslavia has contracted to supply West Germany with 470,000 tonnes of bauxite during 1960 at a price of 1,000,000,000 dinars (approximately £1,250,000 at the official rate of exchange). The agreement has been signed between Jugometal, a Yugoslav foreign trade corporation, and a group of West German buyers. The deal represents an increase of 100,000 tonnes over the contract agreed for this year. The new contract provides for a possible increase in the volume of shipments for next year.

A 16 in. aluminium pipeline, believed to be the largest in diameter ever made of this metal, will be installed for Superior Oil Co. in Lake Maracaibo, Venezuela. This 1,800 ft. line will be laid in the lake as a suction line for a fire protection pump. Reynolds Metals will supply 25,700 lb. of alloy 5083-H113 aluminium for the pipe, which will have a $\frac{1}{4}$ in. wall.

INCREASE IN U.S. CADMIUM PRICE

The Udyllite Corporation, a U.S. company, recently announced an increase of 10 c. per lb. in the price of cadmium stocks, bars and shapes, for quantities up to one ton. The new price, effective from October 1, is \$1.40 per lb. The action was followed by other sellers, who made similar increases. On October 5 the price of cadmium metal in the U.S. was raised by 10 c. to \$1.30, which is slightly higher than the price of 9s. which continues to be quoted in Britain.

The firming up of the price was attributed in New York to a good demand, which had been steadily building up over the past few months. Producers reported that sales had been running in excess of production and stocks had therefore been dwindling.

This is borne out by the latest statistical report issued by the Bureau of Mines, U.S. Department of the Interior, which covers the second quarter of the current year. During this period a decline of 11 per cent in total cadmium metal stocks in the U.S. broke a continuous series of quarterly stock increases begun in the fourth quarter of 1957. Primary and secondary cadmium metal production together declined 17 per cent to 1,100 s.tons, but was 5 per cent above the second quarter of 1958. Shipments of cadmium metal by producers, including internal plant consumption, rose to almost 1,500 s.tons, being 24 per cent higher than in the first quarter of 1959 and 106 per cent higher than in the second quarter of 1958. Metal producers' stocks of cadmium metal declined by 14 per cent, but compound producers' and distributors' stocks of the metal increased by 38 and 25 per cent respectively. General imports of metal rose by 99 per cent, but those of flue dust were down by 31 per cent.

According to the British Bureau of Non-Ferrous Metal Statistics, consumption and uses of cadmium in the U.K. during the first eight months of the current year totalled 78,620 l.tons compared with 66,650 l.tons in the corresponding period of 1958.

NICKEL AND PLATINUM EXHIBITION

An exhibition, to which over 12,000 designers and technologists have been invited, is being staged by the Mond Nickel Co. at Marlands Hall, Havelock Road, Southampton, from October 27-30. The exhibition features the properties of nickel, nickel-containing materials, and the platinum metals. It will be divided into sections dealing with mechanical and physical properties, corrosion-resistance, electrodeposition, strength at high temperatures, toughness at sub-zero temperatures, and welding. These main sections are further sub-divided and include working demonstrations, illustrations, and specimens of materials.

Each day a number of films will be shown. Representatives of the company's development and research departments will be in attendance to discuss technical problems and the latest developments in the nickel industry. A wide range of technical publications will be available.

One of the most notable materials featured will be a new gun-metal alloy, 85/6.5/3/3.5/2 Cu-Sn-Zn-Pb-Ni, which has stable and much better mechanical properties at both atmospheric and elevated temperatures than 85/5/5/5 gun-metal, while still retaining the same adaptability to the production of pressure-tight castings. Its use will enable castings to be more effectively designed, as regards the use of thinner sections, and this could result in a saving of weight and, therefore, cost.

Also on view will be the first automatic rhodium plating plant ever built, which has been designed for use at the company's exhibitions. It has a capacity of 240 items an hour and, handling eight pieces at a time, completes the plating operation in two minutes.

U.S. GERMANIUM PLANT

It has been announced that American Metal Climax Inc., is to build a germanium refining plant at Carteret, New Jersey. Besides producing dioxide from primary and scrap raw materials, the plant will also produce metal from "very advanced facilities". The statement adds that operation on a long-term basis is assured by a contract for supplies from Africa. The source, though not disclosed, is presumably American Metal's subsidiary, the Tsumeb Corporation in South West Africa, which hitherto has sent all its output to Hoboken for refining.

The Olen plant of Société Générale Métallurgique de Hoboken (Metalhoboken) in Belgium processes germanium-bearing ores from Tsumeb on toll and germanium-bearing precipitate from Union Minière in the Belgian Congo. Production data are not available for 1958, but it can be assumed that Union Minière, which produced 13,064 kg. of germanium in 1957 compared with 9,613 kg. in 1956, achieved a further increase in 1958. According to its latest annual report, the enterprise plans to concentrate to an increasing extent on producing germanium in metal form.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The general market picture for all four metals remains unchanged with prices moving within narrow limits and with no definite tendency except for zinc where the undertone is distinctly firm.

SITUATION IN U.S. COPPER STRIKE

Since our last report, the strike situation in the U.S. copper industry has remained unchanged, the news from Chile is slightly more hopeful and the transport strike in the Belgian Congo has been settled. The situation in America has, however, been aggravated by the breakdown of two furnaces at Anaconda's Raritan refinery and it is understood that there have been some enquiries in Europe, not only for wirebars, but also for rod.

It is still considered that in spite of the President's invocation of the Taft-Hartley Act in both the waterfront strike and now in the steel strike, such action is unlikely in respect of the copper strike. This is probably a good moment to sum up the latest position, as known in London, which seems to be that the talks between the Mine Mill and Smelter Workers Union are continuing but at a low level and with only a small

section of the Union. Kennecott have also been in contact with the steel workers union at Garfield but, here again, no progress appears to have been made. Anaconda have also been holding discussions with the Mine Mill Union but, again, no progress is reported. Apart from these two companies it is understood that no approach has been made for re-opening of conversations with the other struck companies.

This state of affairs seems to indicate that after a glimmer of hope last week the outlook is once more very gloomy and the resumption of work seems as far off as ever. It can be assumed that with the steel workers returning, operations in that industry will get under way again early in November and that some demand for copper will, therefore, spring up from those fabricators who are able to start shifting metal again to those plants which have been slowing down through lack of steel. Should this movement be of any size, the scarcity of copper may become such that the world price will be forced upwards to perhaps 35 c. per lb.

The behaviour of the London market, however, underlines the fact that most people consider the long-term outlook for the copper price to be downwards in view of over-production and, therefore, any upward movement is likely to see an

increase in the backwardation with fairly heavy sales being made for forward delivery. At the moment the backwardation in London has almost disappeared again but this is likely to prove to be only temporary. Stocks this week have fallen by 1,516 tons to a total of only 11,547 tons and it is expected that a further decline will take place next week.

TIN REMAINS STEADY

The tin market remains featureless although, here again, some upward movement in the price can be expected with the increasing activity in the steel industry in the U.S. Elsewhere consumption remains at a satisfactory level and this is enabling the Singapore market to remain steady in spite of slightly over average offerings each day.

On Thursday the Eastern price was equivalent to £810½ per ton c.i.f. Europe.

LEAD STILL FRIENDLESS; ZINC DISTINCTLY FIRM

The lead market is still without friends and although the price is somewhat above the lowest level reached recently, there is little confidence that the improvement will be maintained as, although consumption is satisfactory, it still falls short of availability.

The zinc market, on the other hand, is showing signs of distinct firmness, with the backwardation once more increasing. The majority opinion is that this tendency may continue for some time, more especially as consumption remains at a high level. The September zinc figures for the U.S. showed that production was some 7,500 tons lower than in August but that domestic shipments increased by about 2,000 tons, whilst end of month stocks were about 1,000 tons higher. The domestic shipments were bolstered up by good demand from almost all sections of the industry except for galvanizers.

In the U.S. the same picture is presented for both the metals with doubt being expressed in some quarters that the lead price of 13 c. per lb. can be maintained and in others that the resumption of work in the steel industry may result in a rise in the zinc quotation. It is interesting to note that once again some of the minor import quotas for lead and zinc have been filled within the first week of the quota period as by October 9, the "other countries" quota for lead, zinc ore and zinc had been filled and, in addition, Italy had also fulfilled its zinc quota.

Closing prices are as follows:

	Oct. 8		Oct. 15	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£232½	£232½	£234½	£234½
Three months	£232½	£232½	£234	£234½
Settlement	£232½		£234½	
Week's turnover	18,350 tons		14,000 tons	
LEAD				
Current ½ month	£70½	£70½	£69½	£69½
Three months	£71½	£71½	£71½	£71½
Week's turnover	4,775 tons		6,625 tons	
TIN				
Cash	£794	£794½	£793½	£794
Three months	£794½	£795	£793	£793½
Settlement	£794½		£794	
Week's turnover	635 tons		795 tons	
ZINC				
Current ½ month	£87½	£87½	£90½	£91
Three months	£85½	£85½	£88	£88½
Week's turnover	4,900 tons		5,875 tons	

LONDON METAL AND ORE PRICES, OCT. 15, 1959

METAL PRICES

Aluminium, 99.5%, £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 9s. 0d. lb.
Cerium (99%) net, £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 14s. lb.
Germanium, 99.99% Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 1½d.

Iridium, £23/£25 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £245/£250
Magnesium, 2s. 3d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £21/£23 oz. nom.
Osmiridium, nom.
Palladium, £6 10s./£7 10s.
Platinum U.K. and Empire Refined £28 10s. oz.
Imported £26½/£27½
Quicksilver, £71½/£72 ex-warehouse
Rhodium, £41/£45 oz.
Ruthenium, £18/£20 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 80½d. f.o. spot and 79½d. f.d.
Tellurium, 18s. lb.

ORES AND OXIDES

Bismuth	30% 5s. 0d. lb. c.i.f.	20% 3s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifabable) 48% (Ratio 3:1)	£15 15s. 0d. per ton c.i.f.	
" Hard Lump 45% (Ratio 3:1)	£15 10s. 0d. per ton c.i.f.	
" Refractory 40% (Ratio 3:1)	£11 0s. 0d. per ton c.i.f.	
" Smalls 44% (Ratio 3:1)	£14 0s. 0d. per ton c.i.f.	
Baluchistan 48% (Ratio 3:1)	£11 15s. 0d. per ton f.o.b.	
Columbite, 65% combined oxides, high grade	165s./170s. nom.	
Fluorspar—		
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works	
Metallurgical (75/80% CaF ₂)	156s. 0d. ex works	
Lithium Ore—		
Petalite min. 3½% Li ₂ O	40s. 0d./45s. 0d. per unit f.o.b. Beira	
Lepidolite min. 3½% Li ₂ O	40s. 0d./45s. 0d. per unit f.o.b. Beira	
Amblygonite basis 7% Li ₂ O	£25 0s. per ton f.o.b. Beira	
Magnetite, ground calcined	£28 0s./£30 0s. d/d	
Magnetite Raw (ground)	£21 0s./£23 0s. d/d	
Manganese Ore Indian—		
Europe (46% - 48%) basis 65s. 0d. freight	72d./74d. c.i.f. nom.	
Manganese Ore (43% - 45%)	68d./70d. c.i.f. nom.	
Manganese Ore (38% - 40%)	nom.	
Molybdenite (85%) basis	8s. 11d. per lb! (f.o.b.)	
Titanium Ore—		
Rutile 95/97% TiO ₂ (prompt delivery)	£29 per ton c.i.f. Aust'n.	
Ilmenite 52/54% TiO ₂	£11 10s. per ton c.i.f. Malayan	
Wolfram and Scheelite (65%)	127s. 6d./132s. 6d. per unit c.i.f.	
Vanadium—		
Fused oxide 95% V ₂ O ₅	8s./8s. 11d. per lb. V ₂ O ₅ c.i.f.	
Zircon Sand (Australian) 65 - 66% ZrO ₂	£16/£17 ton c.i.f.	

Mining Finance

No Change

As our market correspondent reports elsewhere, mining shares tended to be overlooked in the boom which followed the re-election of a Conservative government with an increased majority. Indeed, there was little prospect of any other situation, because neither major party had offered any new thinking on the subject of British mining, at home or overseas.

The usual place to look for a market reaction to a change in the political situation is in the Kaffir market, but even here there was little change. The most important reason for this was that a strong Conservative government is generally taken abroad to mean a stronger sterling. The obverse of this coin is that the dollar is relatively weaker which leads to the expectation of further hedge buying from the U.S.A. especially if an all-round (as opposed to unilateral) devaluation appears likely. If the election had gone the other way, on the other hand, a similar situation might have come about as a result of U.K. hedging. There seems to be no reason, therefore, why the present selective buying of Kaffirs should not continue.

In other mining markets the key factor is the long-term international growth of living standards, coupled in the very long term with shortages of new sources of many metals. Irrespective of U.K. politics, therefore, base metal shares should, over a period, go

higher, subject to the occasional fluctuations caused by temporary imbalance in the supply/demand relationships.

THE SHAPE OF TIN AGREEMENTS TO COME

With the end of the present International Tin agreement only twenty months away, and the I.T.C.'s decision on its continuance (or otherwise) due to be taken not later than the end of June next year, it is by no means too early to start thinking about the problems which will then have to be faced.

Mr. J. H. Rich, of Tronoh Mines, is probably the first tin company chairman to get his views on this subject on to paper. In his statement to shareholders (extracts, p. 374) Mr. Rich lists some of the points which the I.T.C. will have to consider. First and foremost, Mr. Rich once more draws attention to the outstanding weakness of the present agreement—that it relies for its success on the goodwill and restraint of two major exporters, Russia and China. That this must always be an unknown quantity was shown by the tin market events of autumn 1958, when offerings from behind the Iron Curtain came close to shipwrecking the agreement. The only possible remedy is to link these two major producers to the scheme more closely than heretofore, a difficult but

perhaps not impossible task in the present easier East-West climate.

Mr. Rich made another suggestion of equal importance. The operations of the buffer stock manager, he says, are made far too rigid by the obligation to offer to buy metal at a publicized price. This renders him vulnerable to market speculation. This is undoubtedly true and it is important to remember that the unsatisfactory experience of the 1930s does not rule out the alternative policy of allowing the manager freedom to exercise his judgment. The fundamental difference between the earlier scheme and that at present in force is that in the 1930s the manager was an agent of the producing countries only. Now, on the other hand, he works in the interest of the market as a whole and his responsibility is to a body representing both producers and consumers. A practicable alternative to the present arrangement might be to allow the manager to work to his own judgment, subject only to frequent scrutiny of his operations by the I.T.C.

In the longer term, the solution to tin's recurring difficulties must lie in an extension of demand, and Mr. Rich pays just tribute to the work of the Tin Research Institute in this field. The most promising field of experiment has proved to be the highly fungicidal and peat-icidal properties of certain organic compounds of tin. Technologists in many industries have been impressed by these properties, and, says Mr. Rich, there appear to be good prospects for a considerable consumption of tin in this form.

COPPER PRELIMINARIES

Because of the admirable quarterly reports published by the companies of the Rhodesian Selection Trust group, the publication of the preliminary annual figures of these companies is of little importance. For the record, salient figures are tabulated below:

	1958-9 (000)	1957-8 (000)
Roan Antelope		
Sales (l.tons) ...	80.6	77.4
Net profit £ ...	2949.5	1451.9
after		
Tax (£) ...	1910.0	870.0
Replacements, etc. ...	1100.0	650.0
Tax (£) ...	1910.0	870.0
To res. ...	1350.3	675.4
Mufulira		
Sales (l.tons) ...	87.5	88.8
Net Profit £ ...	3964.4	2720.0
after		
Tax ...	2410.0	1430.0
Replacements, etc. ...	1200.0	750.0
To res. ...	1300.0	1250.0
Chibuluma		
Sales (l.tons) ...	19.1	27.2
Net Profit £ ...	1144.7	1151.5
after		
Replacements, etc ...	200.0	200.0
To res. ...	1150.0	1150.0
R.S.T.		
Net prof. in own a/c ...	1672.7	956.6
Group prof. ...	7264.0	4875.1

Of considerable importance, on the other hand, are the dividend declarations which accompany the preliminaries. As will be seen, these are much in line with market expectations. Roan's final of 7d. gross, making 10d. for the year, exactly doubles last year's dividend, and is closely in line with the relationship between the profits earned in the two years. Mufulira's 3s. 9d. makes 5s. 6d. for the

LONDON MARKET HIGHLIGHTS

The wild scramble to deal in Steel and Industrial shares that took place on Monday left Mining share markets very much in the cold. South African Golds also had an indifferent Johannesburg market to contend with and share prices became irregular. A general setback in O.F.S. issue developed under the lead of St. Helena which dropped 2s. to 79s. 3d. following rumours that the September quarter developments results would be disappointing. Western Holdings fell 2s. 6d. to 167s. 6d. but the older mines were still steady to firm.

Later dealings on Tuesday saw a recovery develop which gained strength on the Wednesday. The result was that St. Helena rallied to 80s. 9d. and second thoughts on the imminent development news suggested that average gold values might be in the region of 900 in.dwt.s. compared with 1,029 in the June quarter.

Hopes connected with the other September quarterlies lifted Western Deep to 52s. and West Driefontein to 185s., while Loraine advanced 1s. 3d. further to 34s. 9d. A spurt of 2s. 4½d. to 20s. ex dividend in Lydenburg Estates stemmed from a Press comment which pointed out that the share price, covered by investments, made no allowance for the company's property prospects in South Africa.

Buyers were also looking ahead to the coming flotation of the Leslie and Bracken mines in the Kinross area.

Anticipation of a share in these ventures lifted Hendersons to 16s. 9d. while a theory that Union Corporation shareholders would be offered rights in the new mining issues raised Union Corporation to 77s. 6d. Also particularly firm were "Johnnies" at 71s. 6d. on a persistent investment demand.

While the demand for Industrial shares resulted in yields shrinking to as low as 2 per cent in many cases, it began to be noticed that the companies which provide industry with its vital raw materials offered much higher returns. Indeed, last week showed that the trend back to Mining shares was starting to get under way. Coppers, Tins, Lead-zincs, all revived with the "investment" stocks in the lead. Chartered quickly advanced 5s. 6d. to 99s. 3d. and Selection Trust edged ahead to 121s. 3d. Messina were soon 5s. 7½d. up at 115s. 7½d. (and still looking attractive in front of next month's dividend) while a revival of speculative buying raised Rhodesia-Katanga 4s. to 18s. at one time.

Most of the Tins moved ahead. Buyers found that stock was not at all readily available and shares like Tronoh (21s.) were especially firm. In the Lead-zinc group, Consolidated Zinc were outstanding at 67s., but the buyers appeared to have missed the virtues of Rhodesia Broken Hill which at 10s. 3d. yield well over 7 per cent.

TRONOH MINES

MR. J. H. RICH'S STATEMENT

The annual general meeting of Tronoh Mines Limited was held on October 13 in London.

Mr. J. H. Rich, Chairman, presided.

The following are extracts from his Statements circulated to Shareholders:—

My first duty is a sad one, to report the tragic loss we have sustained by the passing of two of our colleagues—Mr. E. V. Pearce and Mr. D. W. Thomas. Mr. Pearce, who joined the Board in March, 1945, occupied a leading position in the tin world, being very actively connected with a number of the largest producing and smelting concerns. Mr. Thomas was also prominent in the industry, as Director of a number of Malayan tin mining companies. Both served the Company unstintingly, and they are sadly missed, not only for their contributions to the business of the Company, but also for their personal qualities. To fill these vacancies Mr. H. E. Barringer and Mr. J. N. Davies have been appointed to the Board.

The balance of profit for the year 1958 is £261,928. Dividends totalling 1s. 4d. per share, less Income Tax, have been paid, and the Directors recommend payment of a final dividend of 4d. per share, together with a bonus of 6d. per share.

The Company's compulsory contribution to the Buffer Stock up to the end of 1958 amounted to £185,608, and the cost of obtaining the permissible stock of tin concentrates was £53,923. This money is virtually frozen until the Buffer Stock is wholly or partially liquidated

and the Sales Quotas are sufficiently increased to allow the realization of permissible stocks. As the metal price for some time past has been above the level at which the Buffer Stock Manager may sell, and as in fact he has been selling, it is hoped that a partial refund of the contributions will not be long delayed.

The Company continues its search for new areas but is hampered by the lack of a national land policy, but it is hoped the position will improve if the Government of the Federation finds it possible to adopt at an early date the recommendations of the Land Commission which it appointed. It is gratifying to note that the Federation Government has lost little time in adopting one of the recommendations by setting up a National Land Council to formulate with the State Government a co-ordinated land policy.

The Federation of Malaya has now been an independent sovereign state for more than twelve months, and it is very gratifying to note that Ministerial assurances have been given on several occasions that the Federation Government realizes the importance of the tin mining industry and intends to do everything possible to assist its development.

Tin Control

The International Tin Agreement expires on June 30, 1961, and not later than June 30, 1960, the International Tin Council will have to come to a decision on whether the Agreement is to be renewed and if so on what terms. The idea of control of production by legislation by no means receives unanimous support. Be that as it may, the

fact remains that the present agreement revealed one outstanding weakness in that not all major producers were participants. This weakness was taken advantage of by Russia and China, who were able to sell unlimited quantities of tin at prices which had been maintained by the financial support and the very severe curtailment of the exports of the producing countries which were participants of the agreement.

Another item that calls for consideration in any new agreement concerns the operations of the Buffer Stock Manager which, in the present agreement, are far too rigid in that he is obliged to offer to buy tin at a publicized price, thereby rendering him vulnerable to the activities of market manipulators.

All international commodity control agreements can only be entered into through the United Nations Organization and then only after it has been found that there is, or is likely to be, a burdensome surplus or that there is, or is likely to be, widespread unemployment or under-employment arising therefrom. According to the present trend of production and consumption it would not be easy to establish that there is, or is likely to be, a burdensome surplus.

As regards unemployment, the experience with the existing agreement has been that it does nothing to reduce unemployment. If the conditions mentioned are strictly enforced then the renewal of the agreement would appear to be doubtful.

I have no hesitation in once more taking this opportunity of bringing to your notice the very valuable work done by the Tin Research Institute.

MINING FINANCE—Continued

year against 3s. 3d., and the R.S.T. payment, which largely derives from Mufulira, is increased from 7d. for 1957-8 to 1s. 1d. with a final of 9d.

ANOTHER RIO ACQUISITION

In association with Mr. R. W. Rowland, Rio Tinto (Southern Rhodesia) has acquired the entire capital of Vulcan Minerals (Pvt.). Vulcan owns an emerald deposit and other mineral claims in the Belingwe district of S. Rhodesia.

A great deal of work remains to be done before it is possible to estimate the full potential of the deposit, it is stated. Rio Tinto will carry out a full geological and mining survey of the area and, in consultation with the S. Rhodesian Government will "give due attention to the highly specialized business of marketing Belingwe emeralds".

MOUNT ISA OUTPUT EXCEEDS 8,000 TONS

Speaking at the official opening of Mount Isa's new Townsville Kembla copper refinery, Mr. G. R. Fisher, the chairman, revealed that on one day recently, mine output reached 8,700 tons. This is 700 tons in excess of the target set for the intermediate phase of Mount Isa's expansion programme, and represents an increase in output of more than 90 per cent over the past three years, during which period Mount Isa has spent

about £20,000,000 on capital projects.

The Townsville electrolytic refinery is intended to refine blister copper which has previously been railed to Port Kembla and then shipped overseas for treatment. The present capacity is 40,000 tons per annum, and this will be increased in step with expansion at the mine until it becomes possible to refine 100,000 tons per annum in a few years time. By the time that capacity has been increased to 60,000 tons—probably late next year—expenditure on the refinery will have totalled some £5,000,000.

GOPENG, KINTA TO MERGE?

As we go to Press, it is learnt that the Boards of Gopeng Consolidated and Kinta Tin have agreed to recommend to their shareholders a merging of the two companies. The merger will take the form of an offer by Gopeng Consolidated of 9 Gopeng stock units for every 5 shares of Kinta. Full particulars will be announced in two or three days' time.

This move may be the beginning of a period of rationalization and consolidation in the Malayan tin industry. During the period of enforced cuts in production and levies on output it has become apparent that the larger producers are in a much better position, both financially and technically, to face the industries. The larger concerns are also able to point to a superior cost experience, by virtue of their ability to switch production to cheaper dredges or low-cost areas whenever necessary. Above

all, the present division of the industry into a multitude of single-dredges, many of which are under the same technical management as five or six other companies, makes consolidation comparatively easy to achieve.

Another aspect of consolidation is the ever-growing need to find and make available new tin-bearing areas in Malaya. Speaking in Kuala Lumpur last Wednesday before leaving to take up his new appointment as deputy-chairman of London Tin Corporation, Sir Douglas Waring gave a grave warning that the Malayan mining industry might find itself facing extinction if a more active land policy was not pursued. If production were to be maintained from present areas, costs would rise to a point at which many consumers would be driven to intensify their research into substitutes.

Anglo-Burma Tin.—A report from the Anglo-Burma Tin Co., states that its available resources have now been invested in selected mining investments, and revenue from these should enable a small dividend to be paid at the end of the financial year. On September 30, the company's net assets, including quoted securities, amounted to approximately 4s. 5d. per share. In view of this, and the fact that it is still impossible to place a value on the shareholding in Anglo-Burma Tin (1956), Anglo-French Exploration have agreed not to make their intended bid of 4s. 6d. per share. Notwithstanding this, Anglo-French will continue to accept any shares offered to it at 4s. 6d. until further notice.

KINTA KELLAS TIN DREDGING COMPANY

EFFECT OF RESTRICTED OUTPUT

The 32nd annual general meeting of Kinta Kellas Tin Dredging Company, Limited was held on October 8 in London, Mr. T. H. Macer, M.C. (the chairman), presiding.

The following is an extract from his circulated statement:

In my last Statement, I tried to give Stockholders an idea of the effect restriction of output under the International Tin Agreement would have upon the affairs of the Company. The Accounts now show how serious the effect has been. By dint of rigid economies it has been possible to make a very small profit, despite the fact that the dredge only operated for 147 days during the year. I must point out, however, that a full charge has not been made for wear and tear of plant, only the actual expenditure for repairs and renewals having been included in the mining costs. I regret, in the circumstances, that it is quite impossible to consider the payment of even a very small dividend.

There has been a certain improvement in the position during recent months. The Company's quota for July/September, 1959 has been fixed at 37½ tons of tin ore compared with 31½ tons for the severest period of restriction in October/December, 1958.

There is no doubt that the restrictions imposed by the International Tin Agreement are slowly beginning to have the desired effect and, as I anticipate a further gradual easing in the quota position during the latter half of the current financial year, I look for improved re-

sults for 1959/60, but whether the improvement will be sufficient to allow a dividend remains to be seen.

The Buffer Pool

The Company's contribution to the funds of the Buffer Pool amounted to £18,211 at March 31, 1959. I am advised that contributions should cease in October or November, by which time approximately £25,000 will have been contributed, nearly 25 per cent. of the issued capital of the Company. This is a very heavy burden for a small company to bear and I trust now that the Buffer Pool has sold substantial quantities of its holding of metal, with consequent considerable funds in liquid form, a method will be found to make possible some return to producers.

One final point of interest to Stockholders is that under existing regulations regarding the fixing of assessments, the Company, by operating for the prescribed period during the first two years of the restriction period, will qualify for a revision of its assessment in July, 1960 and, at the present time, it is estimated that the increase should be approximately 32 per cent. I must sound a word of warning, however, that this increase is calculated on existing regulations and our expectations could be upset if there were any change in the apportionment of Malaya's domestic quota between the different classes of mines.

Regarding the future, I can add little to what I said last year. We have an efficient well managed unit and very substantial ore reserves, provided we are allowed to produce without too much restriction and we can obtain a reasonable price for our tin, the Company has first class prospects.

The report was adopted.

GEEVOR TIN MINES

The forty-sixth Annual General Meeting of Geevor Tin Mines, Ltd., was held on October 14 in London.

Mr. G. W. Simms (the Chairman) presided, and the following is an extract from his statement for the year ended March 31, 1959:—

The profit (before taxation) amounted to £74,534. After providing £35,293 for taxation, your Directors recommend the payment of a final dividend of 2s. per share and a bonus of 6d. per share, making, with the interim dividend of 6d., a total distribution for the year of 3s. per share, less tax, requiring £37,539.

Government's emphatically proclaimed intention to stimulate industrial production in the U.K. gave reasons for hope that something would be included in the last Budget which would be helpful to the metal mining industry here, but instead of easing the tax burden it has been increased by Government's action in connection with the de-rating of industry. One would have thought that the experience of the effect in other countries such as Canada, Australia, the U.S.A., and Eire, as regards mine taxation reliefs, would have some weight with the U.K. Government and that the effect of adequate depletion allowance for a wasting asset and recognition of the high risk nature of mining enterprise by granting taxation relief in the early stage of development would have been given a trial. The cost to Government of such relief in a Budgetary sense would be negligible, and it would stand to gain substantial ancillary benefits apart altogether from the fact of developing an important industry.

The report was adopted.

Coming Events

A special joint meeting of the North of England Institute of Mining and Mechanical Engineers and the National Association of Colliery Managers will be held in the Lecture Theatre of the Literary and Philosophical Society, Westgate Road, Newcastle upon Tyne, at 2.30 p.m. on October 28, 1959. The Report of the Sub-Committee on Mining Explosions issued by the Coal Industry National Consultative Council—Safety and Health Committee—will be discussed, and Sir Andrew Bryan will introduce the discussion. The Institute's Annual General Meeting will be held on December 12, at 2.30, when the new President will deliver his inaugural address.

The Cornish Institute of Engineers will hold their second general meeting at the School of Mines, Camborne, on October 23, at 7.15 p.m. An illustrated lecture will be given by Mr. J. Symons, A.C.S.M., on "Shaft Sinking for the Collieries".

The Institution of Mining Engineers will hold their 66th Annual General Meeting at The Institution of Naval Architects, 10 Upper Belgrave Square, London, S.W.1., on January 28, 1960. Other meetings are announced as follows:

The Manchester Geological and Mining Society at Wigan Mining and Technical College, November 12, at 4 p.m.

A lecture on "Utilization and marketing of coal" will be given by T. J. Sales.

The Midland Counties Institution of Engineers, at The University, Nottingham, on November 18, at 4.30 p.m. A lecture on "The Geology of the East Midlands Coalfields" will be given by P. L. Collinson.

The Midland Institute of Mining Engineers, Danum Hotel, Doncaster, November 5, 2.30 p.m. A lecture will be given on the "Failures and successes in coal-face mechanization in a highly-mechanized area", by J. A. Stewart and E. B. Park. A further lecture has been fixed for December 10.

The Mining Institute of Scotland, at the Royal College of Science and Technology, Glasgow, on November 18, at 5.15 p.m. A lecture will be given by Mr. W. Speir on "Problems in the dewatering and development of the Riggfoot field, New Cumnock".

The North of England Institute of Mining and Mechanical Engineers will hold their annual general meeting at The Institute, Neville Hall, Newcastle upon Tyne, on December 12, at 2.30 p.m., when the presidential address will be given.

The North Staffordshire Institute of Mining Engineers will hold a Students' Question Night on November 2, at 5.30

p.m., North Staffordshire Technical College, Stoke-on-Trent.

The South Staffordshire and Warwickshire Institute of Mining Engineers, Swan Hotel, Lichfield, November 24, 3 p.m., when a lecture on rapid plough application will be given by J. McFarlane and J. H. Weaver.

The South Wales Institute of Engineers, at The Institute, Park Place, Cardiff, on November 19, at 6 p.m. A lecture on "The construction of main roadway junctions underground" will be given by W. A. Terrell and P. B. Rees.

The Southern Counties Institute of Mining Engineers, at 3 Grosvenor Crescent, London, S.W.1, November 13, 3.30 p.m. A lecture on "The mechanization of the conditioning of coal with oil" will be given by A. R. Burkin, Ph.D., M.Sc., F.R.I.C.

The annual conference of the Institution of Industrial Safety Officers will be open with a dinner on Friday, November 6, at 7 p.m., at the Grand Hotel, Brighton. The dinner will be preceded by the Annual General Meeting, at which officials for the ensuing year will be elected.

The British Petroleum Co. Ltd., has arranged to take the Odeon Cinema, Leicester Square, and other London cinemas, for the showing of a programme of films of interest to stockholders and others. The films will be shown from 10.15 a.m. to noon on Wednesday, November 18.

Company News

A four-day Conference has just been held by George Kent Ltd., at Luton, which was attended by members of the Kent world-wide sales organization, members of the Board of Directors of the parent company, and senior research development, production service and sales engineers.

Allis-Chalmers International announce the establishment of Allis-Chalmers Italiana S.p.A., a majority owned subsidiary of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., U.S.A., and the acquisition by the Italian company of the facilities of Vender S.p.A., manufacturers of crawler tractors and spare parts at Cusano, Milan.

Mandoval Ltd., importers of crude vermiculite, have moved to Barrington House, 59 Gresham Street, London, E.C.2. Tel.: MET 9101.

British Insulated Callender's Cables Ltd., have signed an agreement with The Burndy Corporation of Norwalk, Connecticut, U.S.A., to form a new U.K. company to be known as BICC-Burndy Ltd. The new company has an authorized capital of £250,000 and has been formed with the object of manufacturing and marketing Burndy products in the U.K. and Commonwealth.

Distington Engineering Co., Ltd., Workington (branch of The United Steel Companies Ltd.), announce that Mr.

A. E. Bell has been appointed commercial manager with effect from October 1, and will assume responsibility for the buying department of the branch.

Sir Lindsay Parkinson and Co. has obtained a £350,000 contract from the Ministry of Works for the demolition of an existing building and the erection of a reinforced concrete six-storey laboratory block and workshops at the Safety in Mines Research Establishment, Broad Lane, Sheffield. Work is to start on October 26.

The recent announcement of the integration of the Reichdrill Manufacturing Co. Ltd., with the Consolidated Pneumatic Tool Co. Ltd., has been followed by further details of the reorganization involved. Robert C. Paul, managing director of the Reichdrill Manufacturing Co. Ltd., will now head the Reichdrill Division of the Consolidated Pneumatic Tool Co. Ltd., and operate in co-operation with their contracting department from the company's head office at 232 Dawes Road, London, S.W.6. All manufacturing operations and spares will be transferred to the Consolidated Pneumatic Co.'s works at Aberdeen. The Reichdrill Manufacturing Co.'s head office and works at Wishaw, Scotland, and sales office at Clarges Street, London, will cease to operate as from Friday, October 16, and the new arrangements will become effective on Monday, October 19.

NIOBIUM-TANTALUM SEPARATION

Experiments are stated to have been carried out successfully at the State chemical-metallurgical plant VEB Elektrochemisches Kombinat Bitterfeld in Bitterfeld, East Germany, for the separation of niobium and tantalum.

These rare metals, in the form of pentachlorides NbCl_5 and TaCl_5 , can be separated in a column separation process after the raw carbides and oxides have been chlorinated with liquid halogenation media. The columns used in Bitterfeld experiments were loaded with silica gel. After processing the niobium contained almost no tantalum at all.

In a liquid-liquid extraction process of separation, niobium and tantalum oxides were produced from disintegration melting from raw carbide. Tributylphosphate was used in the extraction process.

MINE CAPTAIN required for metal mine in Ghana. Applicants should hold a degree in Mining and have at least 5 years' practical experience. Starting salary not less than £110 per month with substantial bonuses. 12 month tours with 3 months leave on full pay. Wife's passage paid. Free quarters, medical treatment and other benefits. The post is permanent and pensionable. Applications giving qualifications, experience and personal details to Box No. 643, c/o The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

Reinforced Concrete Underground

ROADWAY AND JUNCTION



The Cementation Company has more than 40 years' experience and specialised knowledge of shaft sinking, tunnelling, reinforced concrete constructions for underground excavations, junctions and pit bottoms.

As a result, it can offer the best possible advice on economical working methods, whatever types of strata are involved.

The reinforced concrete roadway and junction shown above involves principles of construction which can be modified to suit any underground excavation.

The Company has a full range of modern plant and equipment to undertake work of this kind.

THE CEMENTATION COMPANY LIMITED

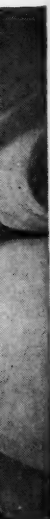
MINING DEPARTMENT
BENTLEY WORKS • DONCASTER Telephone: Doncaster 54175-54136

HEAD OFFICE: 20 Albert Embankment, London, S.E.11. Telephone: RELiance 7654

1959

been
State
Elek-
ld in
the
m of
can be
pro-
oxides
hale-
sed in
d with
obium
ll.
cess of
oxides
eration
lphos-
rocess.

for
lic-
lin-
ars'
ing
per
ses.
nth's
pas-
edi-
fits.
pen-
ving
and
No.
td.,
gate,



ge of

s kind.